COMPARISON OF ANTERIOR & POSTERIOR APPROCHES FOR INTERNAL JUGULAR VEIN CANNULATION

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ABSTRACT

Central venous cannulation is a vital intervention in the critically ill and in patients undergoing elective and emergency surgeries. Success depends on proper choice of insertion site. Internal jugular vein has a valveless course to superior vene cava, possibility of repeated cannulation and low incidence of complications. Knowledge of various approaches for Internal jugular vein cannulation is imperative.

MATERIALS AND METHODS:

It was a prospective randomised study . 60 patients of similar age group, weight and equal sex distribution were randomly classified into two groups. IJV cannulation was done by anterior approach in Group A and by posterior approach in Group P. The following parameters were compared - number of attempts, time for identification of vein, duration for cannulation, ease of threading, carotid puncture, haematoma, pneumothorax, hemothorax , catheter kinking, catheter

displacement, thrombophlebitis and limitation of neck movements.A similar analysis was made in the pbose patients.

RESULTS:

All the patients were comparable in terms of age , gender and body mass index. The number of attempts, time for identifying the vein and duration of cannulation was lessere in the posterior approach. The rate of carotid puncture, haematoma, pneumothorax, catheter kinking, displacement, thrombophlebitis and limitation of neck movements was less with the posterior approach.

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INTRODUCTION

Central venous catheterization is a vital intervention in critically ill patients and in major elective and emergency surgeries.It has become indispensible for volume resuscitation,central venous pressure monitoring,hemodialysis,transvenous cardiac pacing,long term hyperalimentation,infusion of vasoactive or inotropic drugs and mixed venous oxygen saturation measurement[1-5].

The proper choice of insertion site is essential for success.Various methods of placement have evolved,each with its own advantages and potential complications.Advantages of internal jugular vein cannulation relate to its consistent,predictable,anatomic location,its valveless course to the superior venacava and right atrium,the possibility of repeated cannulation and low incidence of complication in experienced hands[31].

Cannulation of the brachial and external jugular vein may fail because of technical diificulties and thrombosis,while the subclavian route raises the valid objection of dangerous pleural complications[6,8,9].Femoral vein cannulation is indicated in conditions like Superior venacaval obstruction.There is high rate of catheter sepsis and thrombophlebitis with femoral vein[7].

There are numerous approaches for cannulating the Internal jugular vein.The anterior approach is being practiced widely,since the identification of landmarks and palpation of carotid artery permits a beginner to learn the procedure easily.The major complications of this approach are carotid puncture and haematoma.Many literatures has quoted a lesser incidence of these complications with the posterior approach.It is also easier to perform in critically ill patients as the trendelenberg position which may cause hemodynamic instability is not mandatory for this approach[31].

Each approach has its own pros and cons.This study compares the two commonly practiced anterior and posterior approaches for catheterization of the Internal jugular vein.

AIM OF THE STUDY

The aim of the study is Comparison of the Anterior and Posterior approaches for internal jugular vein cannulation,in terms of

1.No.of attempts

2.Duration of cannulation

2.Ease of insertion and

4.Complications of each route.

ANATOMY OF INTERNAL JUGULAR VEIN

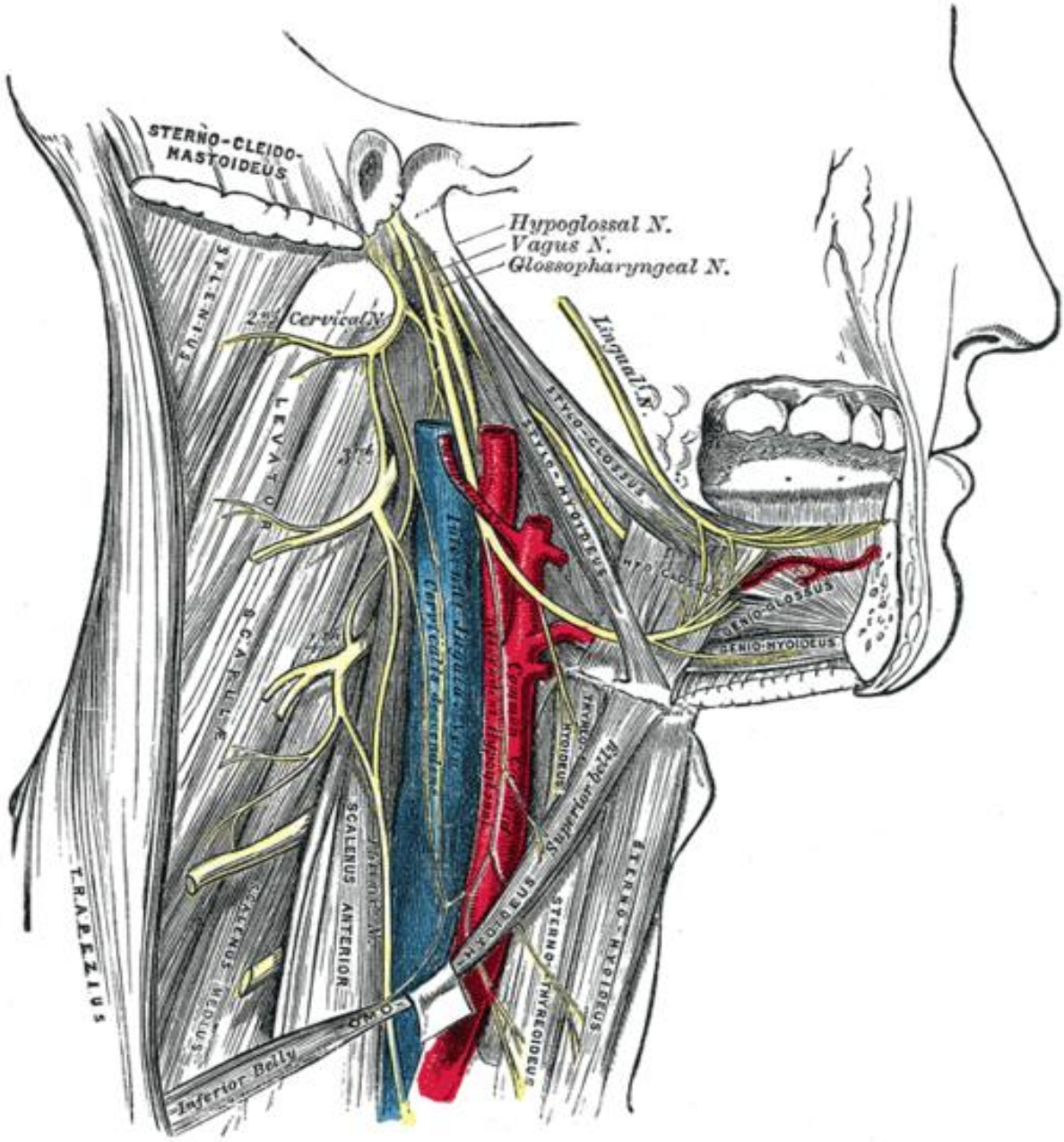
The Internal jugular vein collects blood from the brain,superficial parts of the face and neck.It is directly continuous with the transverse sinus and begins in the posterior compartment of the jugular foramen,at the base of the skull.At its origin it is somewhat dilated and this dilatation is called the superior bulb.It runs down the side of the neck in a vertical direction,lying at first lateral to the internal carotid artery and then lateral to the common carotid.At the root of the neck it unites with the subclavian vein to form the innominate vein.A little above its termination is a second dilatation,the inferior bulb[11]

RELATIONS OF IJV:

Above,it lies upon the Rectus capitis lateralis behind the internal carotid artery and the nerves passing through the jugular foramen.Lower down,the vein and artery lie upon the same plane,the glossopharyngeal and hypoglossal nerves passing forward between them.The vagus descends between and behind the vein and the artery in the same sheath.The accessory nerve runs obliquely backward,superficial or deep to the vein.At the root of the neck the right internal jugular vein is placed at a little distance from the common carotid artery and crosses the first part of the subclavian

artery,while the left internal jugular vein usually overlaps the common carotid artery.The left vein is generally smaller than the right and each contains a pair of valves,which are placed about 2.5 cm above the termination of the vessel[11,12]

ANATOMICAL RELATIONS OF IJV



APPROACHES FOR IJV CANNULATION

Numerous approaches (atleast 19) to the IJV have been described in the literature.The major approaches are summarized below.The classification into high,mid or low approaches relates to the point of insertion of the needle in the neck.The anterior,central and posterior approaches are in relation to the borders of the sternocleidomastoid muscle[17]

1.THE HIGH ANTERIOR APPROACH:

The point of insertion of the needle is chosen at the medial border of the Sternocleidomastoid muscle at the level of superior border or prominence of the thyroid cartilage.Insertion of the needle 5cm above the clavicle has also been described.The carotid pulse is palpated to ensure the needle is entered lateral to the artery.The needle is inserted at an angle of 30-40 degree to the skin,directed towards the ipsilateral nipple[35]

2.THE APICAL OR LOW ANTERIOR APPROACH:

The triangle formed by the two heads of sternocleidomastoid and clavicle is identified.After medialising the carotid artery,the needle is inserted at the apex of the triangle at an angle of 30-45 degree to the skin,directed towards ipsilateral nipple[13,14]

3.THE HIGH CENTRAL APPROACH:

The Carotid artery is palpated and the needle is inserted 1-2cm lateral to it or where the venous pulsations are best visualized and balloted.The needle is inserted through the sternacleidomastoid muscle in a caudal direction at an angle of 30 degree to the skin[17]

4.THE LOW CENTRAL APPROACH:

The notch at the upper surface,approximately 0.5-1cm near the sternal end of the clavicle is identified.The point of insertion is 1-2cm above this notch.The needle is directed caudally parallel to the medial plane and 30-40degree to the coronal plane.It is associated with a higher risk of pneumothorax[16]

5.THE HIGH POSTERIOR APPROACH:

The lateral border of Sternocleidomastoid muscle is identified.The needle is inserted just above the junction of the external jugular vein with the lateral border of the muscle or alternatively at the midpoint of the lateral border of the muscle.The needle is directed under the muscle towards the suprasternal notch at an angle of 30degree to the skin[17]

6.THE LOW POSTERIOR APPROACH:

The needle is inserted at the lateral border of Sternocleidomastoid muscle about 3cm above the clavicle and directed towards the suprasternal notch[17]

INDICATIONS FOR PLACEMENT OF CENTRAL VENOUS CATHETER[18]

1.Measurement of central venous pressure

2.Major surgery where major blood loss or fluid shifts is anticipated.

3.Patients with significant cardiac disease and pulmonary disease

4.For intravascular volume assessment in patients when urine output is unavailable or unreliable

5.Infusion of fluids,blood,vasoactive drugs,total parenteral nutrition

6.Pulmonary artery catheterization and monitoring

7.Insertion of transvenous pacemaker

8.Insertion of catheters for hemodialysis and plasmapheresis

9.Aspiration of air emboli

10.Internal jugular vein filter placement

CONTRAINDICATIONS

ABSOLUTE[13,14,18]:

- SVC syndrome where cannulation of Internal jugular,external jugular,antecubital and subclavian vein has to be avoided
- Abdominal trauma and Inferior venacava disruption where femoral vein cannulation has to be avoided
- Infection at the site of cannulation

RELATIVE[18]:

- Coagulopathy(platelet count < 50,000 cells/cumm,INR>1.5)
- Newly inserted pacemaker wires
- Prescence of carotid disease
- Recent cannulation of the Internal jugular vein
- Contralateral diaphragmatic dysfunction
- Thyromegaly
- Prior neck surgery

COMPLICATIONS

Common complications are[19-30]

1.Carotid puncture and Haematoma

2.Pneumothorax,Hemothorax,Hydrothorax,Chylothorax

3.Arrhythmias,cardiac tamponade and cardiac arrest

4. Bacteremia

5.Kinking and displacement of catheter

6.Horner’s syndrome and Injury to 9-12 cranial nerves

7.Tracheal puncture and Endotracheal tube cuff puncture

8.Superior venacava thrombosis and obstruction

9.Aortic catheterization and dissection

10.Air and catheter embolism

REVIEW OF LITERATURE

LS Chudari , US Karmarkar, RT Dixit, K Sonia et al (Journal of postgraduate medicine 1998;Volume 44;Issue 3;Page 57-62) conducted a study on **Comparison of two different approaches for internal jugular vein cannulation in surgical patients.**The authors compared the anterior and posterior approaches of internal jugular venous cannulation in 200 surgical patients,the ease of cannulation and threading,number of attempts required and the incidence of complications following each route.Analysis of ease of threading revealed that 90.5% cannulae were easily threaded by anterior approach and 95.8% by posterior approach,which is statistically significant.Analysis of ease of cannulation in relation to weight showed that there was significantly higher incidence of successful cannulation by posterior approach (97%) in the higher weight group and obese patients compared to anterior approach (75%) (i.e. 0.05 by Chi-square test).There was also a significant decrease in the number of carotid artery puncture using posterior approach(3.1%) compared to anterior approach (16.6%).There was no significant difference in complications or ease of cannulation in lower weight groups using any of the two approaches.Cannulation was difficult and carotid punctures were more (16.6%) in obese patients by anterior approach.Rate of carotid puncture was overall higher by anterior approach (5.0%) as compared to posterior approach (2%).There was no

significant difference in the success of cannulation in non-obese and obese patients.Displacement of the cannula leading to decannulation,kinking and inadequate central venous pressure monitoring was noted in 6 cases in anterior group and 8 cases in posterior group.Most of these occurred in the first twenty-five cases and were due to imperfect suturing of the cannulae hub to the skin.No evidence of local/focal infection was found in any of the 200 patients.Mild thrombophlebitis was usually associated with cases where cannulation was for 48 hours or more and was noted in 8 cases in the anterior approach group and 7 cases in the posterior group.There were no cases of moderate or severe thrombophlebitis.

MohanChandralekha V,Darlong V,Kashyap L et al(European Journal of Anaesthesiology May 2005;Volume 22;p197-198) conducted a study on **Internal jugular vein cannulation - comparison of central approach (palpation method) and posterior approach (non-palpation method**).Six hundred patients scheduled for kidney transplant were included in this study.Internal jugular vein cannulation was performed either by central approach or posterior approach.Number of attempts,cannulation time and incidence of complications were recorded. Successful cannulation with few attempts was more in posterior approach (93.8%) than in conventional central approach (87.5%).Cannulation procedure time was also shorter in posterior approach (413.87 ± 88.02) than central approach (319.62 ± 69.58).Incidence of complications e.g. arterial puncture were less in posterior approach (7/80) compared

to central approach (18/80).The authors concluded that,Internal jugular vein cannulation by posterior approach (non-palpation method) is superior to central approach (palpation method) in terms of number of attempts,speed of cannulation and risk of arterial puncture.

Dong Hun Kim and Eun Ha Suk et al (**Korean J Anesthesiol. 2009 Oct;57(4):455-459)** conducted a study on **comparison of two approaches to internal jugular vein cannulation in young children:ultrasonographic evaluation.**The cross-sectional area of right internal jugular vein and the degree of the carotid artery overlap was evaluated in 47 children using ultrasound at two levels; 1) at the cricoid cartilage (high approach) and 2)at the junction of the two heads of the sternocleidomastoid muscle (low approach).The cross-sectional area was significantly larger by about 28.8% in the low approach than that of the high approach ($P < 0.01$).The internal jugular vein was partially overlapping the carotid artery in 48.9% and completely overlapping in 42.6% in the low approach and in 44.7% and 34.0% in the high approach respectively.The carotid artery overlap was significantly higher in the low approach when compared with the high approach ($P < 0.02$).The authors concluded that,in terms of cross-sectional area,the low approach with larger size is optimal for internal jugular vein cannulation.Although the degree of the carotid artery overlap was higher at the low approach,the internal jugular vein was partially or completely covering the carotid artery in most patients in both approaches.

Vithal K. Dhulkhed ,Amarnath Reddy ,Arun Kumar Gupta ,Pawan Dhulkhed et al (The Internet Journal of Anesthesiology, 2009 Volume 21 Number 2) conducted **An Observational Study Of Change In Diameter Of Right Internal Jugular Vein With Various Body Positions In Volunteers With The Aid Of 2-Dimensional Ultrasonography.**The diameter of the Right Internal jugular vein was assessed by ultrasonography in various positions-supine neutral,supine in 10,15,20 and 30 degree trendelenberg positions.Correspondingly analysis was also made in various positions of the neck-neutral,rotated to 20,45 and 60 degree to the left.Comparison was also made with and without shoulder pillow in all these positions.The results of the study was:Positioning the subject supine in 15° Trendelenburg tilt with head resting on a small pillow and in neutral position or rotated to not more than 45° to left maximized the RIJV diameter.Carotid artery palpation and use of shoulder pad should be avoided.

Belani KG, Buckley JJ, Gordon JR, Castaneda Wet al(Anesth analg.1980 Jan;59(1):40-4) conducted a study on **comparison of the internal and external jugular vein routes for percutaneoucs cerv ical central venous placement.**They compared the rate of success and incidence of complications associated with two currently popular routes of percutaneous central venous cannulation.The study was conducted in 167 patient in whom either internal or external jugular vein catheterization was attempted.Internal jugular vein catheterization (125 patients) was

successful in 91%;an intrathoracic location was achieved in 100%;complications occurred in 12.8%.Complications included one case of catheter malposition,one case of tension pneumothorax and 12 instances of inadvertent carotid artery puncture,one resulting in a paratracheal hematoma and phrenic nerve compression.The success rate of IJV cannulation was higher and carotid artery puncture less frequent when an 18-gauge thin-walled needle and a straight guide-wire were used than when IJV cannulation was performed by blind puncture with a larger over-the-needle catheter.Delayed vein perforation occurred twice.External jugular vein cannulation (42 patients),using a "J" wire technique, yielded a 76% success rate: 93.7% of catheter tips reached an intrathoracic location.No complications occurred.The inference of the study was,IJV cannulation is a more reliable means of percutaneous central venous line placement but is associated with a significant incidence of complications which can be reduced if a technique employing a scout needle and guide-wire.

Cheri A. Sulek, Nikolaus Gravenstein, Robert H. Blackshear and Lee Weiss et al(Anesth Analg 1996;82:125-8) conducted a study on **Head Rotation During Internal Jugular Vein Cannulation and the Risk of Carotid Artery Puncture**.The authors undertook a prospective laboratory study to examine the effect of head position on the relative positions of the carotid artery and the internal jugular vein.Volunteers (n = 12) from departmental staff,18-60 yr of age,who had never undergone cannulation of the IJV underwent imaging of their IJV and carotid

artery.With the subject in a 15degree trendelenberg position,two-dimensional ultrasound images of the IJV and the carotid artery were obtained on the left and right sides of the neck at 2 and 4 cm from the clavicle along the lateral border of the sternal head of the sternocleidomastoid muscle at 0,40 and 80 degree of head rotation from the midline.The percent overlap of the carotid artery and IJV increased significantly at 40 and 80 degree head rotation to both the right and left ($P < 0.05$).Data from 2 and 4 cm above the clavicle did not differ and were pooled.The percent overlap was larger on the left than the right only with 80degree of head rotation ($P < 0.05$).The increased overlap of carotid artery and IJV with head rotation >40degree increases the risk of inadvertent puncture of the carotid artery,associated with the common occurrence of transfixion of the IJV before it is identified during needle withdrawal.They also found that IJV frequently collapses with needle insertion.This may result in puncture of the posterior wall of the vessel and thus of the carotid artery when the two vessels overlap.So,their inference was,to decrease this risk,the head should be kept in as neutral a position as possible,that is ~40degree rotation,during IJV cannulation.

Shanta Chandrasekaran,V.P.Chandrasekaran et al.(International journal of basic medical science September 2011 volume 2;issue 4;issn 0976-3554) conducted a trial on **Anatomical variations of the internal jugular vein in relation to common carotid artery in lesser supra clavicular fossa – a colour doppler study**.Doppler ultrasound was done in cannulating position and the relation of IJV to common carotid

artery was seen on both the sides of the neck.The anterior relationship of IJV to common carotid artery was considered dangerous relation and lateral or anterolateral was considered as safe relation.86 healthy volunteers were included in the study.They belong to the younger age group ranging from 17 to 36 years.On the left side 80% of the volunteers had their IJV either anterolateral or lateral to common carotid artery which is known to be safe relation for cannulation and other 20% had anterior relation which is known to be dangerous,which is statistically significant ($p<0.001$).On the right side 74% of the volunteers had their IJV in safe relation and other 26% had anterior dangerous relation,which is statistically significant ($p<0.001$).The anatomical variations among the volunteer groups from <20 years, 20 – 25 years and > 25 years were not significant ($p>0.05$).Similarly there was no significant anatomical variations between the male and female genders($p >0.05$).The diameters of internal jugular veins on the right and left sides were noted.The mean diameter of the right IJV was 8.7mm and left IJV 8.6mm.The difference is not statistically significant($p>0.05$).The diameters of common carotid artery on the right and left sides were also noted.The mean diameter of the right CCA was 6.563mm and left CCA was 6.532mm and the difference is not statistically significant ($p>0.05$).The dangerous relation (Anterior) of IJV to common carotid artery on left side 20% and on right side 26% which is statistically significant ($p<0.001$).Hence this study concludes that significant numbers of volunteers are having dangerous relationship with common carotid artery which

may end up in arterial puncture while cannulating the IJV with landmark guided approach.

Thomas Suarez,Jefferey P.Baerwald and Chadd Kraus (**December 2002;95;6;1519-1524)** conducted a study on **Central Venous Access: The Effects of Approach, Position and Head Rotation on Internal Jugular Vein Cross-Sectional Area**.They investigated the effects of approach (lateral versus anterior), position (supine versus Trendelenburg) and head rotation (0°, 20° and maximum) during central venous catheterization on the area of the right internal jugular vein.Twenty-four patients were placed in supine position,followed by 25° of Trendelenburg position.In each position,measurement of the anterior and lateral right internal jugular vein cross-sectional areas was obtained by using planimetry with the patient's head oriented at 0°, 20° and maximum rotation.The largest cross-sectional areas were achieved in the lateral approach with the trendelenburg position.In this position,no differences were detected among head rotation conditions.The authors concluded that for those patients who tolerate the Trendelenburg position,the lateral access approach yields the statistically largest target area regardless of head rotation.When the Trendelenburg position is contraindicated,the results of this study suggest other approaches, e.g., the anterior approach,for central venous catheter placement that maximize the internal jugular vein area.

Jeremy A. Lieberman,Kayode A. Williams and Andrew L. Rosenberg et al (Anesth Analg 2004;99;982–8) conducted a study on **Optimal Head Rotation for Internal Jugular Vein Cannulation When Relying on External Landmarks**.They simulated catheter insertion via both an anterior and central approach to the right IJV using an ultrasound probe held in the manner of a syringe and needle in 49 volunteers.There was an equal number of men and women in the study.Men were statistically taller,heavier, and had larger body surface areas than women.The body mass index were equal for men and women.Both the Internal jugular vein and carotid artery were present and patent by ultrasound visualization in all subjects for all head positions.The simulated needle hit the vein or artery as the subjects' heads were rotated through 5 positions between 0° (midline) and 60°.The degree of head rotation was significantly associated with the ultrasound beam intersecting the internal jugular vein using either the anterior or central approach.However,there were no significant differences in internal jugular vein intersection between the two approaches.The probability of hitting the vein using the anterior approach increased for each increment of head rotation from 0° through 60° (P -0.03).The central approach improved internal jugular vein contact for head rotation of 30° versus 0° or 15°(P -0.001 and 0.005 respectively),but there was no significant difference in the vein hits between 30° and 60°.The simulated needle did not hit the carotid artery until the head was rotated at least 30°.As the head position was rotated further,the artery hit rate was higher at 45°

and 60° compared to 30° for both approaches (P -0.01).Age and gender did not affect the likelihood of hitting the vein or artery at any amount of head rotation.Large body mass index or large body surface area did not alter the association of head rotation to hitting the vein.Large BSA and large BMI were independently associated with an increased risk of a simulated needle hitting the artery when the head was rotated to 45° or 60°.The incidence of carotid artery hits for patients with large BSA and large BMI was more frequent using the central approach versus the anterior approach(P -0.05).For subjects with small BSA or small BMI,the incidence of artery contact was 4% for all head positions,using either approach.

Pikwer, A.Baath, L.Davidson, B.Perstoft, I.Ayeson, J et al (AnaesthesiandIntensive care Jan 2008;36;1) conducted a study on **The incidence and risk of central venous catheter malpositioning: a prospective cohort study in 1619 patients.**This prospective clinical study was designed to determine the radiographic catheter tip position after central venous cannulation by various routes,to identify clinical problems possibly associated with the use of malpositioned catheters and to make a cost-benefit analysis of routine chest X-ray with respect to catheter malposition.A total 1619 central venous cannulations were recorded during a three-year period with respect to patient data,information about the cannulation procedures,the radiographic catheter positions and complications during clinical use.The total incidence of radiographic catheter tip malposition,defined as

extrathoracic or ventricular positioning,was 3.3% (confidence interval 2.5 to 4.3%).Cannulation by the right subclavian vein was associated with the highest risk of malposition,compared with 1.4% by the right internal jugular vein.Six of the 53 malpositioned catheters were removed or adjusted.No case of malposition was associated with vascular perforation,local venous thrombosis or cerebral symptoms.They concluded that the radiographic incidence of central venous catheter malpositioning is low and that clinical use of malpositioned catheters is associated with few complications.However, determination of the catheter position by chest X-ray should be considered when mechanical complications cannot be excluded,aspiration of venous blood is not possible or the catheter is intended for central venous pressure monitoring,high flow use or infusion of local irritant drugs.

STUDY METHOD

The study was undertaken entirely in the Department of Anaesthesiology,Government Stanley Medical College and Hospital,Chennai during the period from February 2010 to May 2011 with due permission from the Institutional Ethical committee.A Pilot study was first conducted to define the population and decide on the criteria for patient selection.The study was conducted as a prospective randomized study.From the results obtained in the Pilot study,a target population of 30 subjects in each group was decided.

CRITERIA FOR PATIENT SE LECTION

INCLUSION CRITERIA

- Adult patients >18 years of age
- Patients with weight between 40-80kg
- Both sexes
- Patients of ASA-Physical Status 1-4 undergoing elective and emergency surgeries and critically ill patients

EXCLUSION CRITERIA

- Patients with localized skin infection in the neck
- Patients with history of neck surgery
- Patients with post burns or traumatic scar contracture in the neck(altered anatomy)
- Patients with any localized swelling in the neck(eg:huge thyroid)
- Patients with coagulation abnormality

STUDY MATERIAL

Materials required for the study include:

- 7fr 16cm single or double or triple lumen central venous ca theter
- Finder needle
- Guidewire needle
- Guidewire
- Dilator

- 11 blade
- Sterile drape and towel
- Sponge holding foreceps
- Suture material
- Intravenous cannula
- Monitors-Pulseoxymeter,Electrocardiogram,Non-invasiveblood pressure,capnograph
- Airway equipments
- Drugs for general anesthesia
- All emergency drugs.

After proper screening of the above mentioned criteria,the patients were informed about the purpose of the study and the study methods the day before surgery.A written informed consent was obtained from the patients on the morning of surgery.

- The patients were randomly classified into two groups as,

Group A-Patients undergoing IJV cannulation by anterior approach

Group P-Patients undergoing IJV cannulation by posterior approach.

- The demographic variables like age and sex were recorded.An analysis of all the parameters was also done separately among the obese patients in both the groups.So,height and weight was also recorded to calculate the body mass index.The Body mass index of all the patients was calculated by the Quetelet's index-weight(kg)/height(m^2).As per the values obtained,the patients were categorized based on the body mass index as follows:

  - ❖ Underweight - <18.5
  - ❖ Normal weight - 18.5 to 24.9
  - ❖ Over weight - 25 to 29.9
  - ❖ Obese - >/= 30

- A detailed history of the present and past medical illness was obtained.
- General and systemic examinations was done.
- In patients undergoing elective and emergency surgeries investigations were done and the procedure was performed after administration of general anaesthesia.
- Investigations-Completebloodcount,sugar,Urea,Creatinine,Coagulation

profile,Chest X-ray and ECG was done.

- Peripheral venous access was obtained.
- Monitors-ECG,Pulse oxymeter,ETCO2,NIBP.
- The patient was premedicated with Inj.Glycopyrrolate 0.2mg,Inj.Midazolam 70microgram/kg,Inj.Fentanyl 2microgram/kg.
- Preoxygenation was done with 100% oxygen for 3 minutes.
- Induction of anesthesia was done with Inj.Thiopentone 5mg/kg and neuromuscular relaxation with Inj.Vecuronium 0.1mg/kg.
- Intubation was done with appropriate size endotracheal tube.
- Maintainance of anesthesia was with N20/02 and Isoflurane 0.2-1%.
- The critically ill patients were premedicated with Inj.Glycopyrrolate 0.2mg,Inj.Midazolam 70microgram/kg,Inj.Fentanyl 2microgram/kg.The procedure was performed after skin infiltration with 1ml of 2% Lignocaine.General anaesthesia was not administered for these patients.
- Internal jugular vein cannulation was done by the Author and the observations were recorded by an independent observer who is not related to the study.

TECHNIQUES OF CANNULATION:

The patient was in a supine 20degree head down position. The head was turned to the opposite side and a support was placed under the shoulders to accentuate the landmarks.Under sterile aseptic precautions, the following landmarks were identified at the onset of the procedure:

1.Medial and lateral heads of sternocleidomastoid muscle

2.Clavicle

3.Carotid artery pulsations

4. Ipsilateral nipple

5.External jugular vein

6.Suprasternal notch

ANTERIOR APPROACH:

The triangle formed by the two heads of sternocleidomastoid muscle and clavicle was identified.The carotid artery at the medial end of this triangle was palpated.Near the apex of this triangle,a skin wheal was raised with 1ml of 2% Lignocaine.Skin puncture was made at 30degree to the skin with the needle.The direction of the needle was towards the ipsilateral nipple.With constant aspiration,the needle was slowly advanced until two tissue pops were felt at the prevertebral fascia and the vein

wall.The position in the vein was confirmed by aspiration of dark blood.The vein was cannulated by modified Seldinger's technique.The hub of the cannula was anchored with sutures.

POSTERIOR APPROACH:

The point where the external jugular vein crosses the posterolateral border of sternocleidomastoid muscle is the entry point.A skin wheal was raised at this point with 1ml of 2% lignocaine.The body of the muscle was lifted and the needle was then advanced at an angle of 30degree to the skin,directed towards the suprasternal notch.With constant aspiration,the needle was slowly advanced till two tissue pops were felt at the prevertebral fascia and the vein wall.The position in the vein was confirmed by aspiration of dark blood.The internal jugular vein was cannulated by modified Seldinger's technique.The hub of the cannula was anchored with sutures.

ANTERIOR APPROACH FOR IJV CANNULATION

POSTERIOR APPROACH FOR IJV CANNULATION

The following parameters were compared during IJV cannulation:

1. Number of attempts to identify the vein. In all the patients the right IJV was cannulated first. The maximum no. of attempts for an approach was four. If the vein was not identified by four attempts, the alternate approach was tried on the same side.This was considered as failure of the respective approach. The left IJV was cannulated in case of unsuccessful cannulation with both the approaches on the same side and these patients were excluded from the study.

2.Time taken for identification of the vein.This was the time from skin puncture by the needle during the first attempt to identification of the vein(confirmed by aspiration of dark blood) irrespective of the number of attempts.

3.Time duration for cannulation.This was recorded as the time from skin puncture by the needle to complete threading of the catheter.

4.Ease of threading.Threading of the catheter was considered to be easier or difficult based on the absence or presence of resistance,respectively.

5.Carotid puncture.It was identified by the presence of a gush of bright red blood.If carotid puncture occurs,the needle was withdrawn and compression was applied for five minutes.After five minutes another attempt was made with the same approach,upto to a maximum of four attempts as mentioned earlier.If landmarks are

obliterated by haematoma before four attempts,it was considered as failure of the respective approach and the alternate approach was tried on the same side.

6.Hematoma.

All Patients were taken chest X-ray postoperatively to check the position of CVP catheter and to rule out pneumothorax(if ICD is not placed).The parameters which were observed postoperatively were:

7.Pneumothorax.It was treated by placing an intercostal drain.

8.Hemothorax.It was identified clinically and confirmed with a chest X-ray.It was treated by insertion of an intercostal drain.

9.Catheter kinking.Intraoperatively,inability to aspirate dark blood from the catheter and absent or distorted CVP waveforms was considered to be as kinking.Postoperatively kinking was identified by chest X-ray.In case of kinking,the catheter was removed and another central venous catheter was placed in situ.

10.Catheter displacement.Migration of the catheter to the ventricle or to extrathoracic site was considered as displacement of the catheter.Displacement in to the ventricle was identified from the CVP waveforms and migration to extrathoracic site was identified from the chest X-ray.The catheter was repositioned or replaced by another catheter.

11.Thrombophlebitis.The presence of erythema and swelling at the catheter site was considered to be as thrombophlebitis.In such cases the catheter was removed.

12.Limitation of neck movements.It was defined as the presence of pain on flexion,extension and rotation of the neck.

STATISTICAL ANALYSIS

A sample size of 30 per group was decided during the pilot study.Randomisation of subjects to the two groups was done by using sealed envelopes.

Data was expressed as mean ± SD. Quantitative analysis was compared with independent sample student's t-test.Qualitative analysis was compared with chi-square test.When using these tests to compare mean among two groups,p-value of less than 0.05 was taken as significant.All analyses were done using SPSS version 11.5 statistical software.All values were rounded off to a maximum of two decimals.

OBSERVATION AND RESULTS

TABLE 1:AGE

Anterior Approach		Posterior Approach		t-test	
Mean	Sd	Mean	Sd	Value	Significant level
43.80	15.33	38.80	16.22	1.24	0.22

The minimum age in both the groups was 18 years.The maximum age in Group A was 79yrs and in Group P was 78 yrs.Mean age was 43.8(+/_15.38) in Group A and 38.8(+/_16.22) in Group P.p-value is 0.22 which is not significant.So patients in both the groups were comparable by age.

TABLE 2:AGE IN OBESE PATIENTS

Anterior Approach		Posterior Approach		t-test	
Mean	Sd	Mean	Sd	Value	Significant level
45.90	16.18	36.67	14.31	1.42	0.171

The minimum age in Group A was 34yrs and in Group P was 30 yrs.The maximum age was 77yrs in Group A and 78yrs in Group P.Mean age was 45.9(+/_16.18) in Group A and 36.67(+/_14.31) in Group P.p-value is 0.171 which is not significant.In both the groups,the obese patients were also comparable.

TABLE 3:GENDER DISTRIBUTION

Sex	Anterior Approach		Posterior Approach		Chi-square Test	
	N	%	N	%	Value	Significant level
Male	19	63.30	13	43.30	2.41	p-value-0.12
Female	11	36.70	17	56.70		
Total	30	100	30	100		

The total number of male patients was 19 in Group A and 13 in Group P.In Group A there were 11 female patients and in Group P it was 17.p-value is 0.12 which is not significant.So,the gender distribution was comparable in both the groups.

TABLE 4:GENDER DISTRIBUTION IN OBESE PATIENTS

Sex	Anterior Approach		Posterior Approach		Chi-square Test	
	N	%	N	%	Value	Significant level
Male	06	60.00	03	25.00	2.76	p-value 0.096
Female	04	40.00	09	75.00		
Total	10	100	12	100		

In Group A there were 6 male and 4 female patients.In Group P there were 3 male and 9 female patients.The p-value is 0.096 which is not significant.

TABLE 5:BODY MASS INDEX-DISTRIBUTION

BMI	Anterior Approach		Posterior Approach		Total	
	N	%	N	%	N	%
Under Weight	01	3.33	02	6.67	03	05.00
Normal Weight	15	50.00	06	20.00	21	35.00
Over Weight	04	13.33	09	30.00	13	21.67
Obese	10	33.34	13	43.33	23	38.33
Total	30	100	30	100	60	100

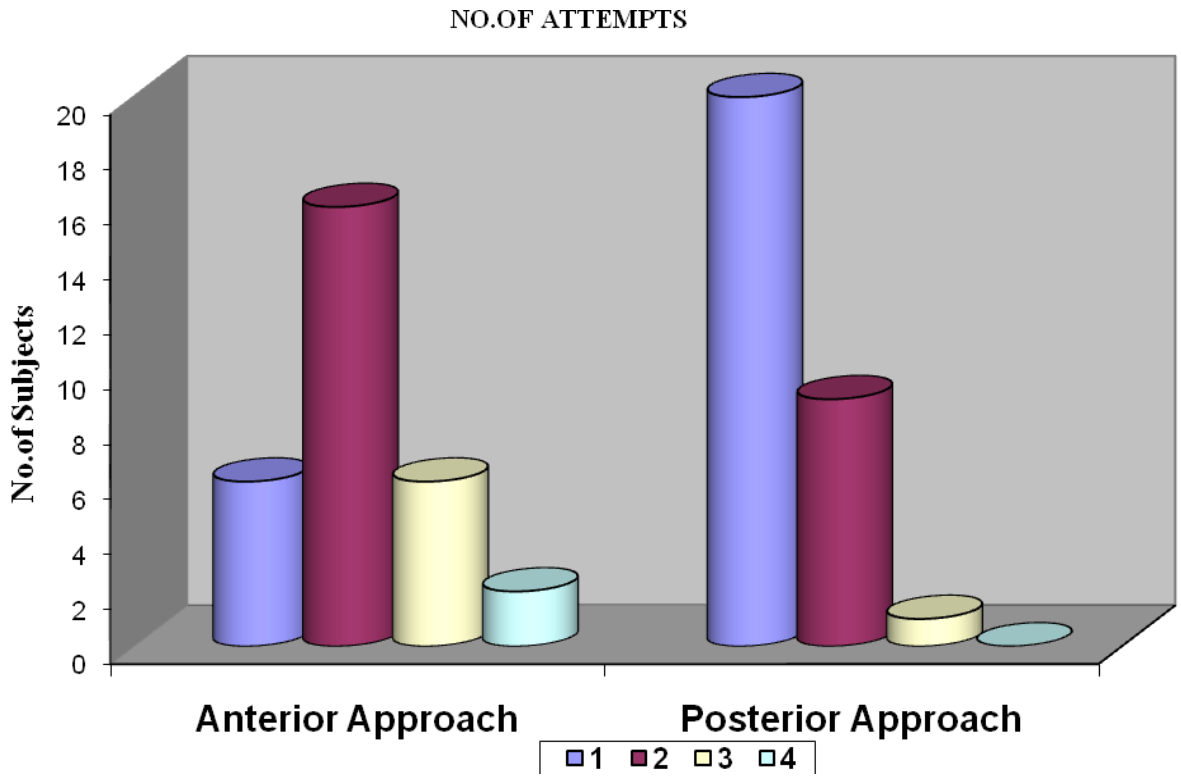
TABLE 6:BMI

Anterior Approach		Posterior Approach		t-test	
Mean	Sd	Mean	Sd	Value	Significant level
25.97	04.76	27.99	5.38	1.55	0.13

The minimum BMI was 18.36 in Group A and 17.3 in Group P.The maximum BMI was 34.6 in Group A and 38.26 in Group P.The mean BMI was 25.97 in Group A and 27.99 in Group P.As the p-value is 0.13,patients in both the groups were comparable by body mass index.

TABLE 7:NO.OF ATTEMPTS

No. of Attempts	Anterior Approach		Posterior Approach		Chi square-Test	
	N	%	N	%	Value	Significant level
1	06	20.00	20	66.70	15.07	p-value 0.002
2	16	53.30	09	30.00		
3	06	20.00	01	3.30		
4	02	06.70	00	-		
Total	30	100	30	100		

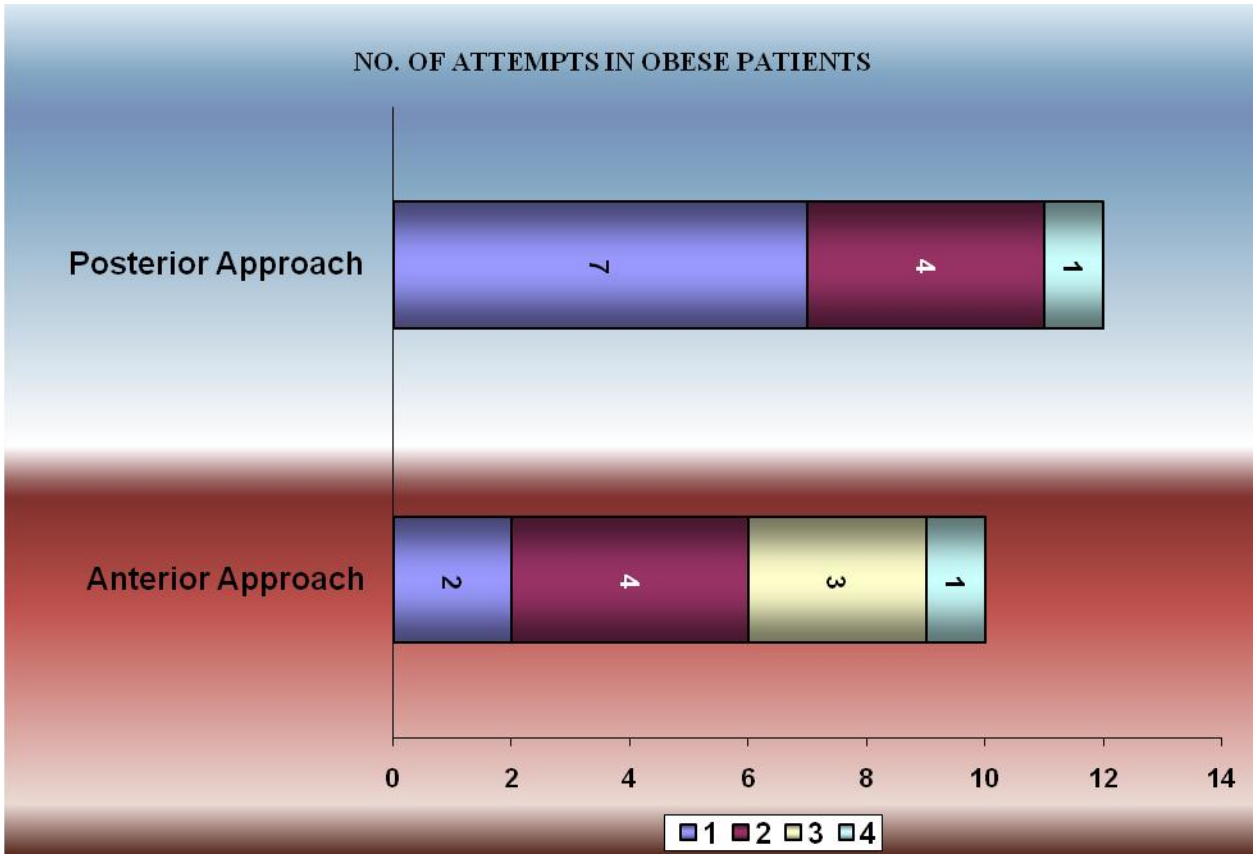


In group A only 6 patients were cannulated in the 1st attempt,whereas it was 20 in Group P.In the 2nd attempt 16 in group A and 9 in Group P were cannulated. 6 patients in Group A and just 1 patient in Group P were cannulated in 3rd attempt.In Group A,2 patients could be successfully cannulated only at the 4th attempt but none of

them in Group P required a 4th attempt.The p-value is 0.002.Statistically the no.of attempts for cannulation was lesser with the Posterior approach.

TABLE 8:NO.OF ATTEMPTS IN OBESE PATIENTS

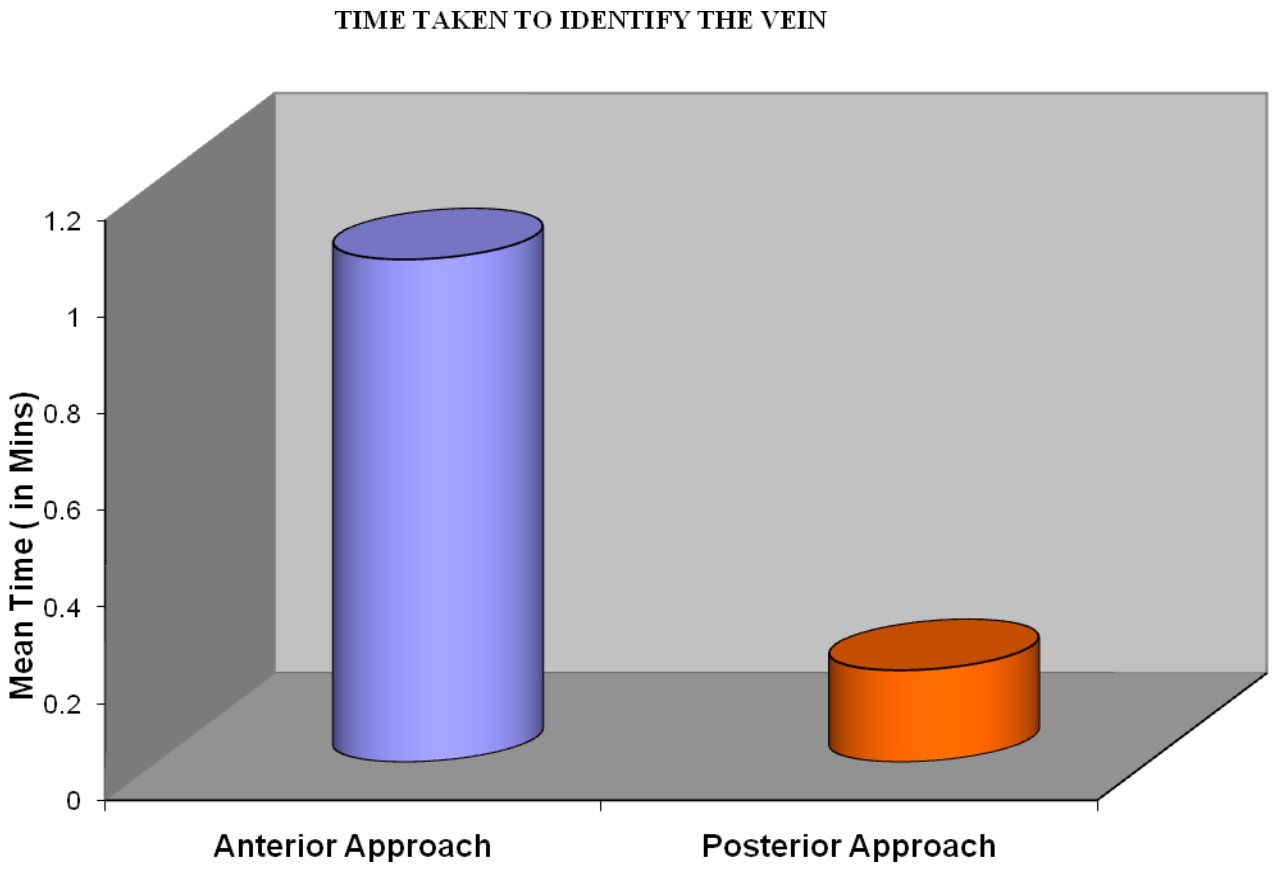
No.of Attempts	Anterior Approach		Posterior Approach		Chisquare-Test	
	N	%	N	%	Value	Significant level
1	2	20.00	7	58.33	4.63	p-value 0.201
2	4	40.00	4	33.33		
3	3	30.00	1	08.34		
4	1	10.00	0	0		
Total	10	100	12	100		



In the obese population,only 2 in Group A were cannulated in 1st attempt,whereas it was 7 in Group P.In both the groups 4 patients were cannulated in 2nd attempt.In the 3rd attempt 3 patients in Group A and 1 in group P were cannulated.One patient in group A was cannulated by 4th attempt and no patient in group P needed a 4th attempt.The p-value is 0.201.So,among the obese patients,the number of attempts for cannulation was not statistically significant.

TABLE 9:TIME TAKEN TO IDENTIFY THE VEIN(MINS)

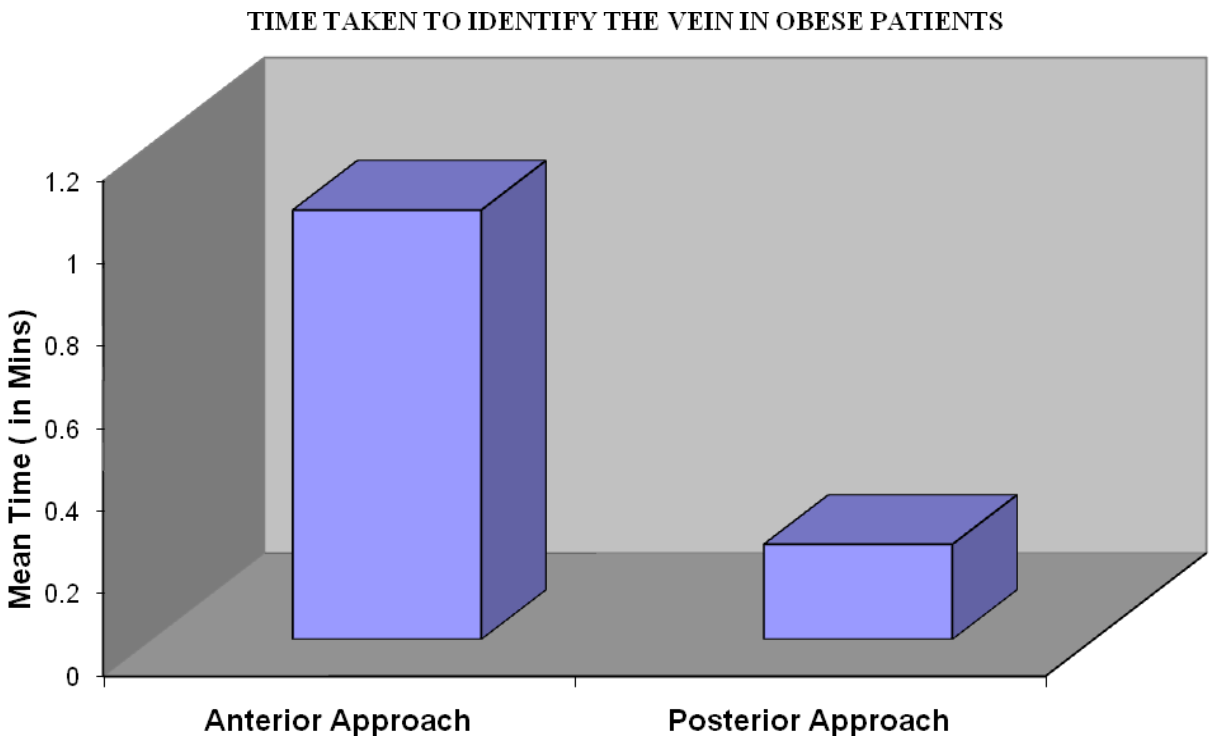
Anterior Approach		Posterior Approach		t-test	
Mean	Sd	Mean	Sd	Value	Significant level
1.04	0.54	0.19	0.13	8.382	p-value 0.000



The average time taken for identification of the vein was 1.04 minutes in Group A,but only 0.19 minute in Group P.The p-value is 0.0001.Hence statistically it is significant.

TABLE 10:TIME TAKEN TO IDENTIFY THE VEIN(MINS) IN OBESE PATIENTS

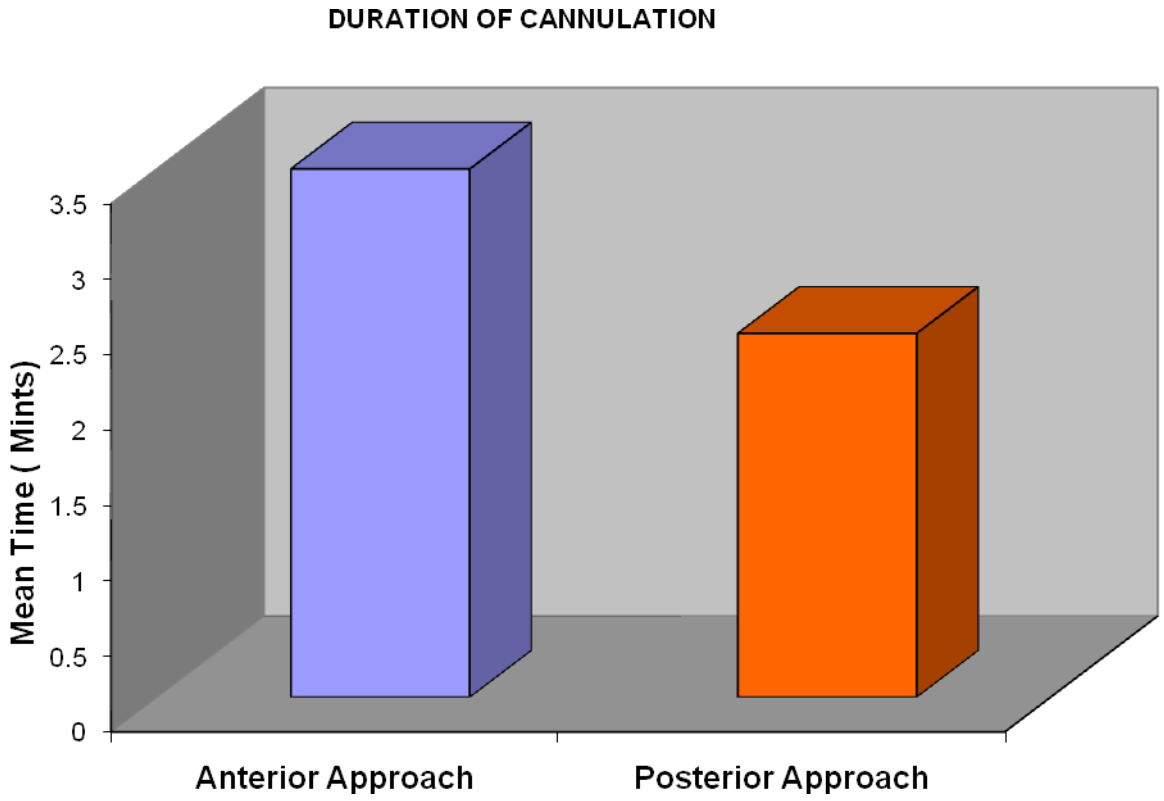
Anterior Approach		Posterior Approach		t-test	
Mean	Sd	Mean	Sd	Value	Significant level
1.04	0.31	0.23	0.19	7.531	p-value 0.000



The results were almost similar to that of the general population.The time taken to identify the vein was 1.04 minutes in Group A and 0.19 minute in Group P.p-value is 0.005.Thus even among the obese patients statistically significant results was obtained for this parameter.

TABLE 11:DURATION OF CANNULATION(MINS)

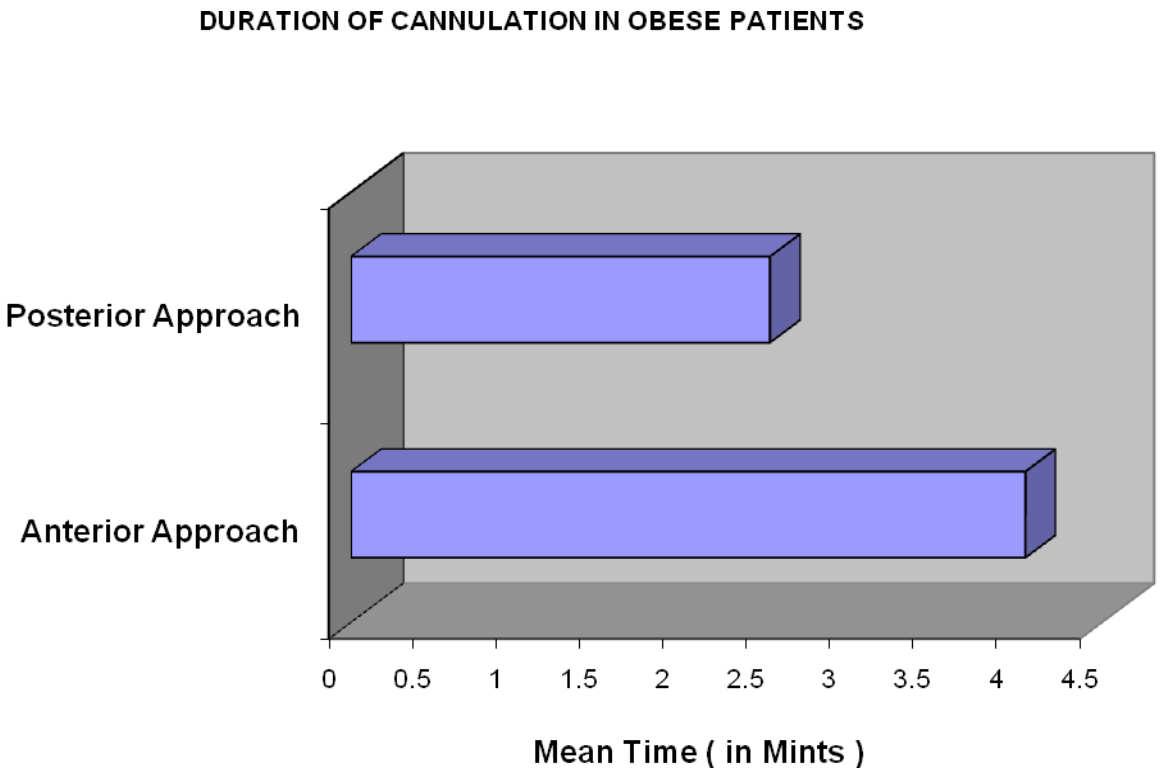
Anterior Approach		Posterior Approach		t-test	
Mean	Sd	Mean	Sd	Value	Significant level
3.50	0.54	2.41	0.26	9.961	p-value 0.000



The mean duration for cannulation of the vein was 3.50 minutes in group A and 2.41 minutes in Group P.p-value is 0.000.The results are statistically significant.So,with the posterior approach the vein could be identified earlier and cannulated faster than the anterior approach.

TABLE 12:DURATION OF CANNULATION(MINS) IN OBESE PATIENTS

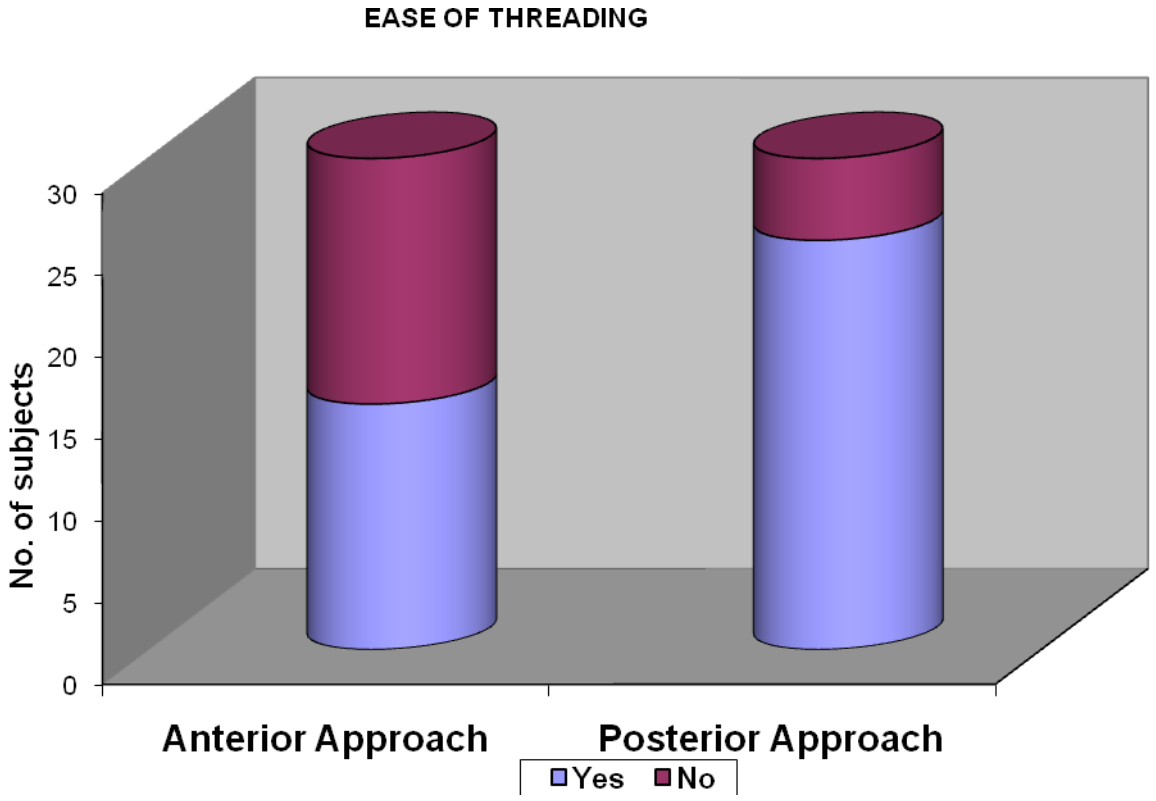
Anterior Approach		Posterior Approach		t-test	
Mean	Sd	Mean	Sd	Value	Significant level
4.04	0.52	2.51	0.25	9.045	p-value 0.000



The average time for cannulation of the vein among patients was 4.04 minutes in Group A and 2.51 minutes in Group P.p-value is 0.000.Thus the results are statistically similar to the general population.

TABLE 13:EASE OF THREADING:

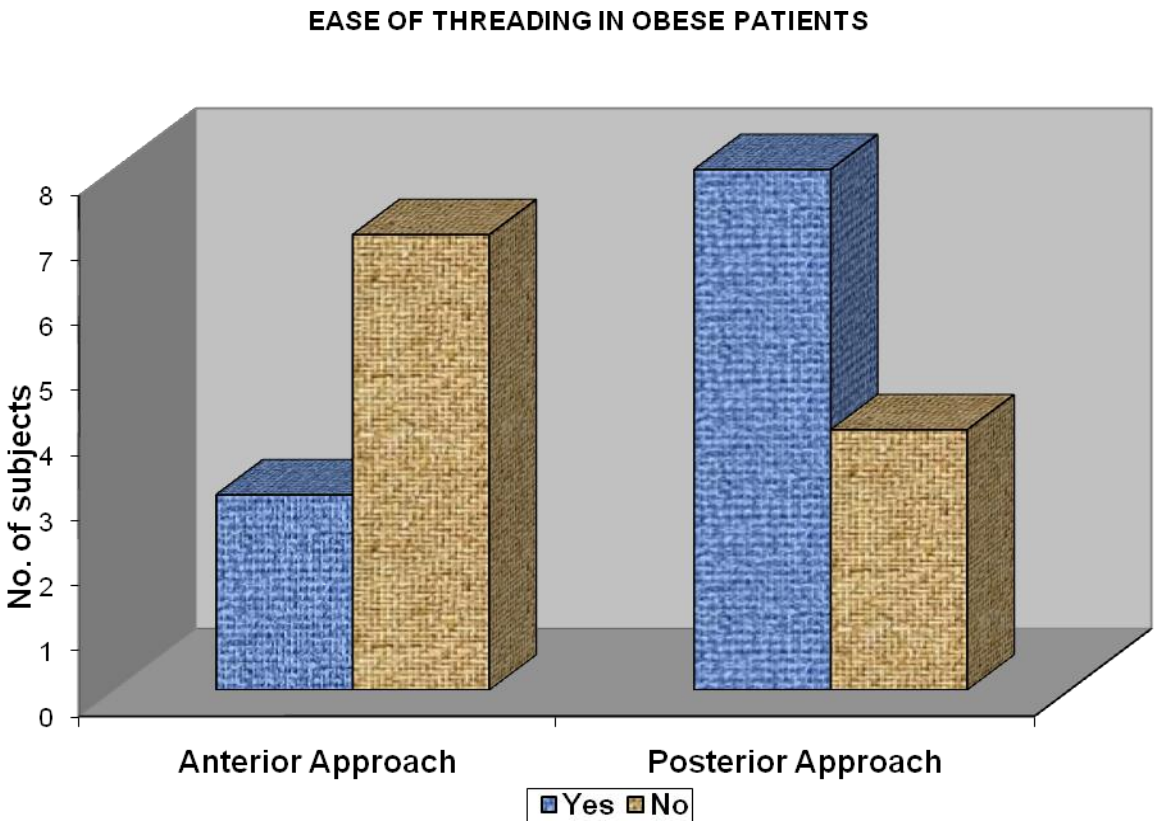
Ease of Threading	Anterior Approach		Posterior Approach		Chisquare-Test	
	N	%	N	%	Value	Significant level
Yes	15	50.00	25	83.33	7.05	p-value 0.05
No	15	50.00	05	16.67		
Total	30	100	30	100		



The catheter could be threaded easily in only 15 patients in Group A,whereas it was 25 in Group P.p-value is 0.05.The results are statistically significant.

TABLE 14:EASE OF THREADING IN OBESE PATIENTS

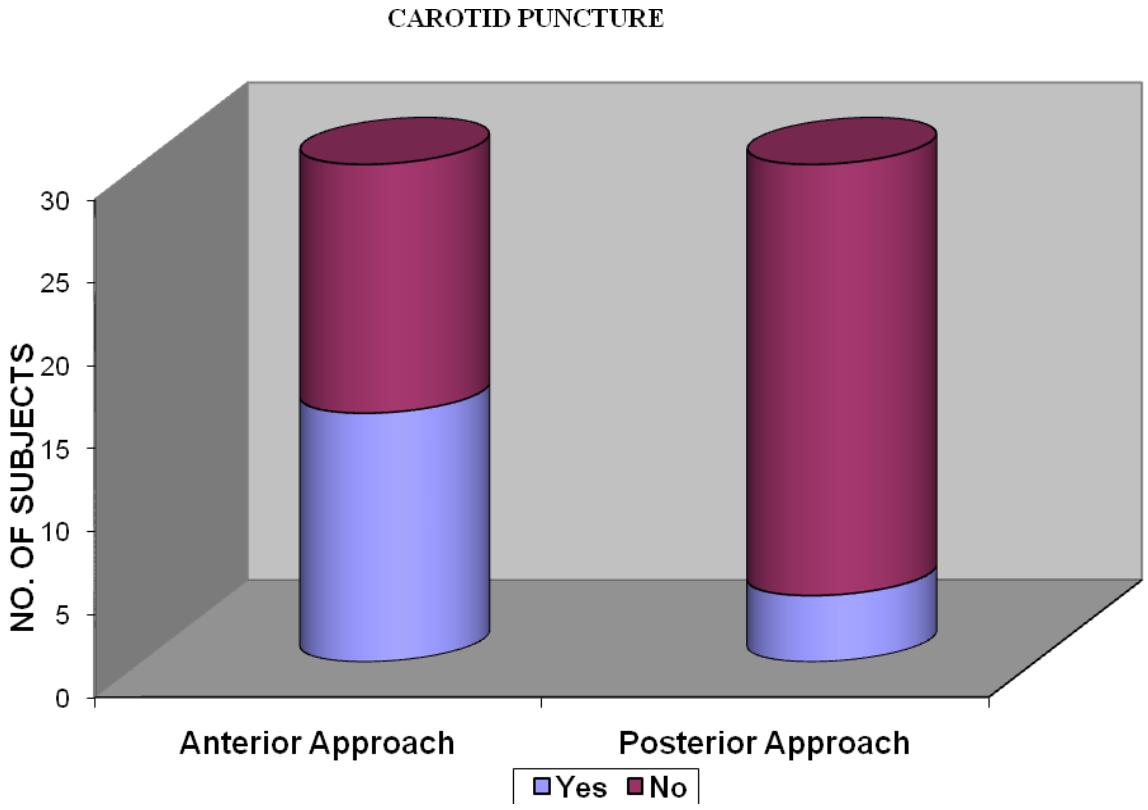
Ease of Threading	Anterior Approach		Posterior Approach		Chisquare-Test	
	N	%	N	%	Value	Significant level
Yes	03	30.00	08	66.70	2.93	p-value 0.09
No	07	70.00	04	33.30		
Total	10	100	12	100		



In Group A threading of the catheter was easier in only 3 patients,but it was in 8 patients in Group P.p-value is 0.09.The results are not statistically significant.

TABLE 15:CAROTID PUNCTURE

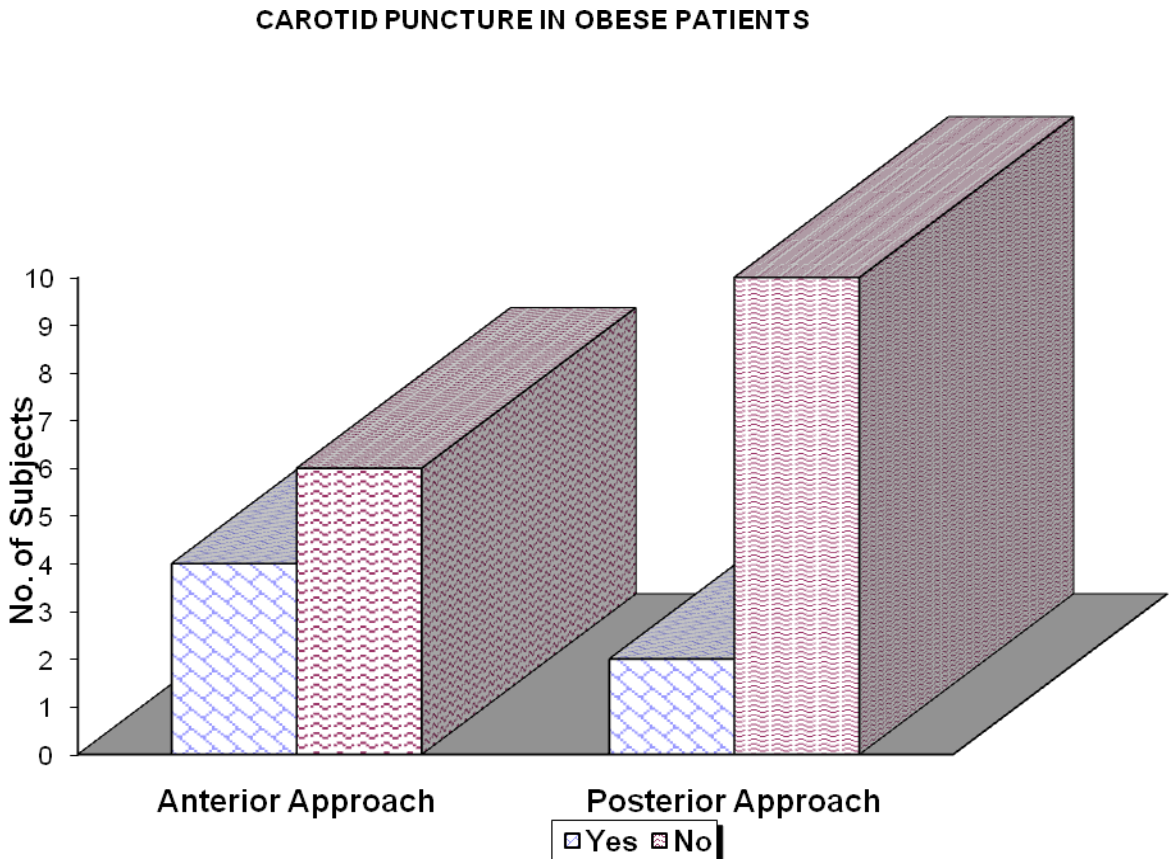
Carotid Puncture	Anterior Approach		Posterior Approach		Chisquare-Test	
	N	%	N	%	Value	Significant level
Yes	15	50.00	04	13.33	9.32	p-value 0.002
No	15	50.00	26	86.67		
Total	30	100	30	100		



Carotid puncture was encountered in 15 patients in Group A and only in 4 patients in Group P.p-value is 0.002.Statistically it is significant.Hence,the rate of carotid puncture is higher in the anterior approach than the posterior approach.

TABLE 16:CAROTID PUNCTURE IN OBESE PATIENTS

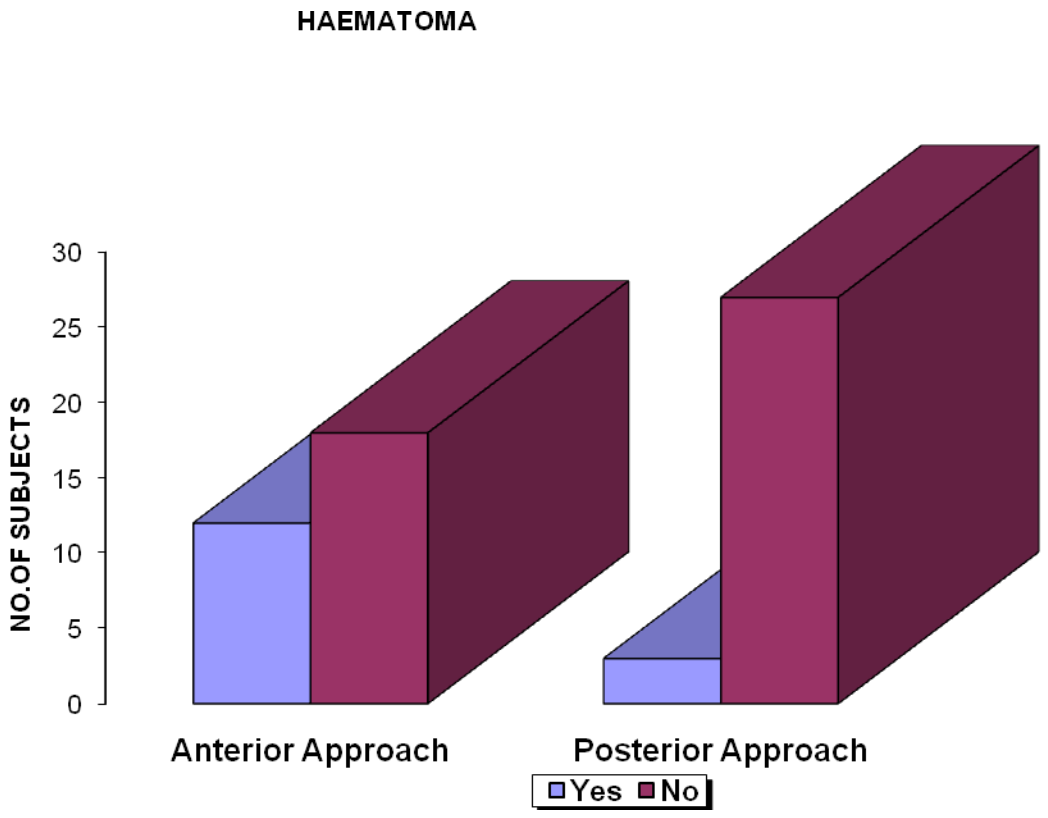
Carotid Puncture	Anterior Approach		Posterior Approach		Chisquare-Test	
	N	%	N	%	Value	Significant level
Yes	04	40.00	02	16.70	1.50	p-value 0.021
No	06	60.00	10	83.30		
Total	10	100	12	100		



Carotid puncture was observed in 4 patients in Group A and in 2 patients in Group P.p-value is 0.021.Statistically significant results are obtained.Thus,Carotid puncture is comparatively low in posterior approach both in the obese and in the non-obese.

TABLE 17:HAEMATOMA

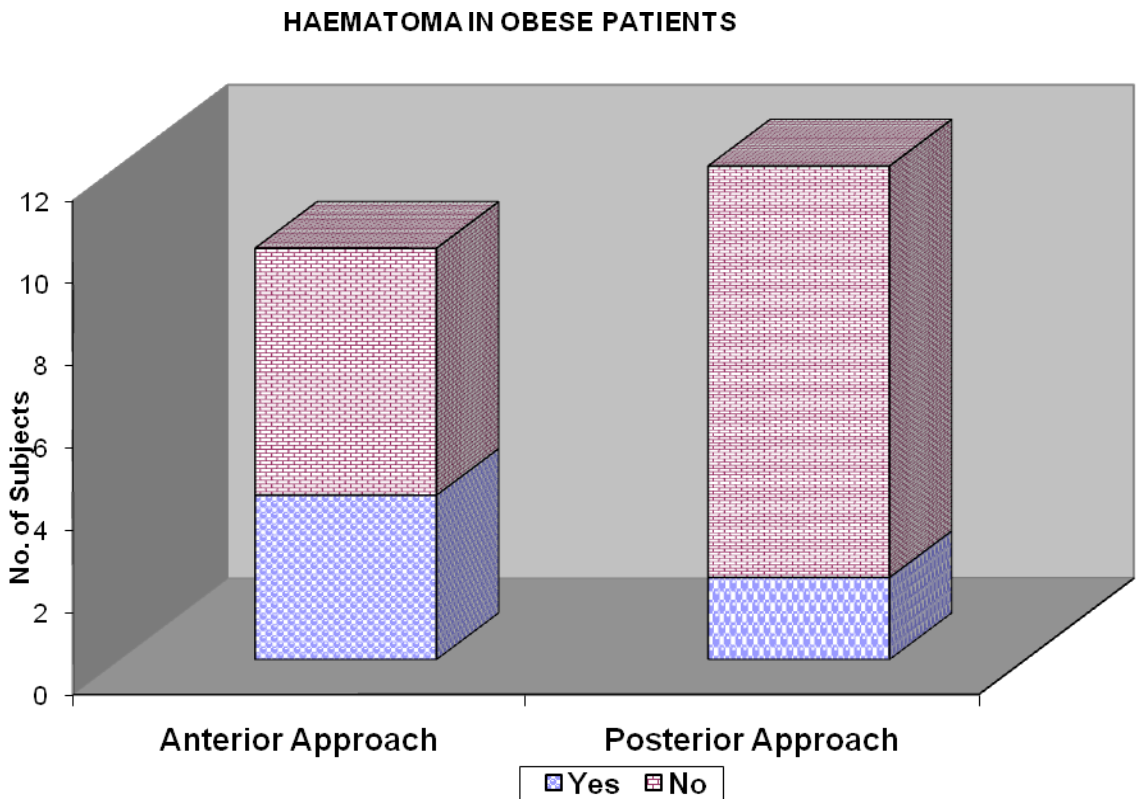
Haematoma	Anterior Approach		Posterior Approach		Chi-square Test	
	N	%	N	%	Value	Significant level
Yes	12	40.00	03	10.00	7.20	p-value 0.01
No	18	60.00	27	90.00		
Total	30	100	30	100		



In Group A haematoma was observed in 12 patients and in only 3 patients in Group P.p-value 0.01.The results are statistically significant.Similar to carotid puncture,the rate of haematoma is also high in the anterior approach.

TABLE 18:HAEMATOMA IN OBESE PATIENTS

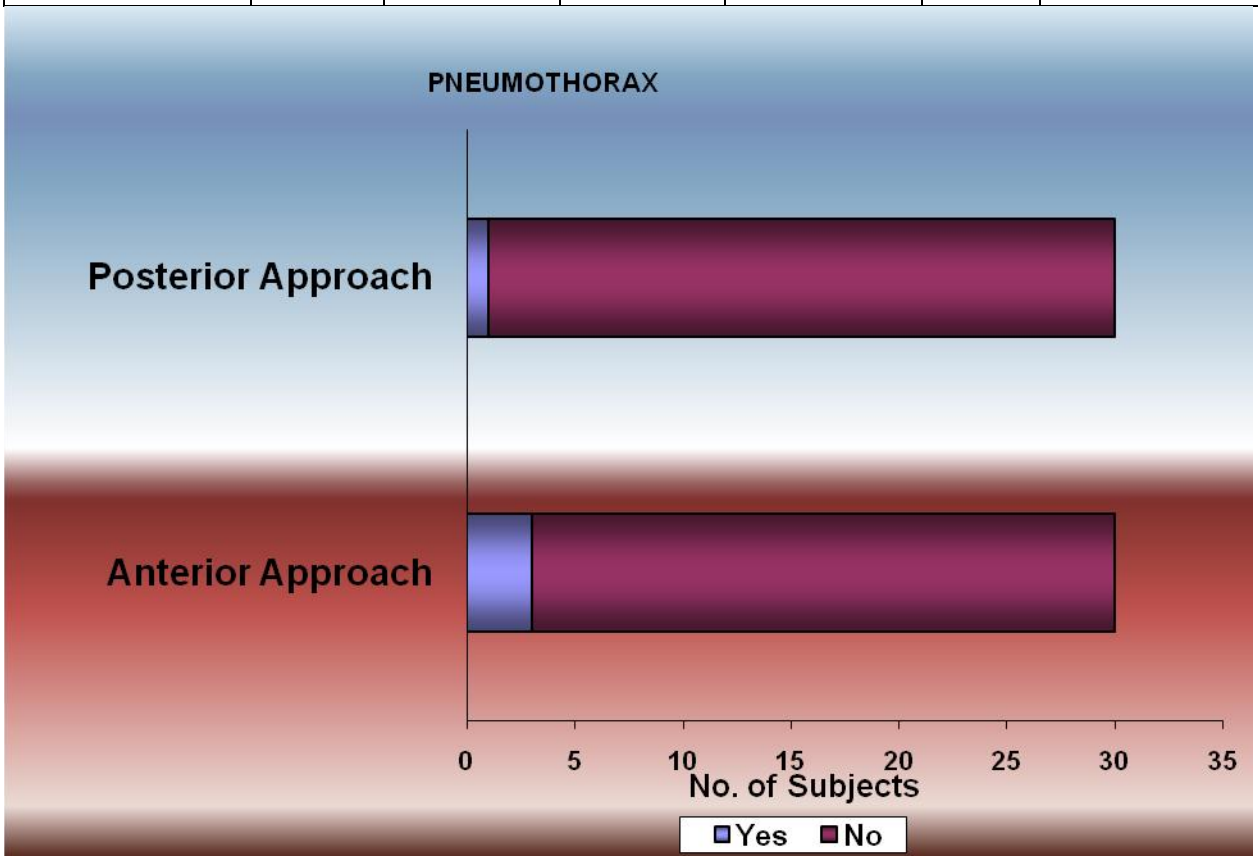
Haematoma	Anterior Approach		Posterior Approach		Chi-square Test	
	N	%	N	%	Value	Significant level
Yes	04	40.00	02	16.70	1.50	p-value 0.221
No	06	60.00	10	83.30		
Total	10	100	12	100		



In the obese patients haematoma was observed in 4 patients in Group A and 2 patients in Group P.p-value is 0.221.The results are not statistically significant.Although statistically significant results were obtained in the general population,it was not so in the obese patients.

TABLE 19: PNEUMOTHORAX

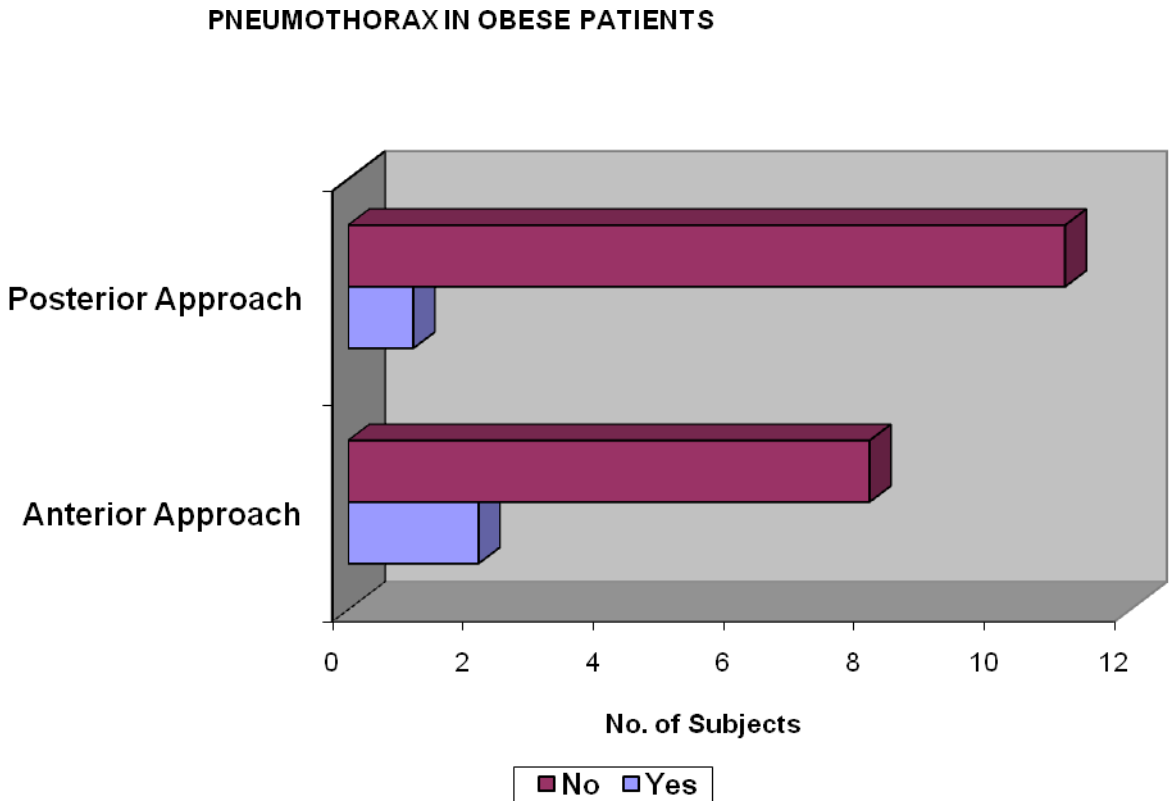
Pneumothorax	Anterior Approach		Posterior Approach		Chi-square Test	
	N	%	N	%	Value	Significant level
Yes	3	10.00	1	3.30	1.07	p-value 0.30
No	27	90.00	29	96.70		
Total	30	100	30	100		



Pneumothorax was encountered in 3 patients in Group A and 1 patient in Group P.p-value is 0.30.Although few cases of pneumothorax is observed,the results are not statistically significant.

TABLE 20:PNEUMOTHORAX IN OBESE PATIENTS

Pneumothorax	Anterior Approach		Posterior Approach		Chi-square Test	
	N	%	N	%	Value	Significant level
Yes	02	20.00	01	08.30	0.630	p-value 0.427
No	08	80.00	11	91.70		
Total	10	100	12	100		



Among the obese patients pneumothorax was observed in 2 in Group A and 1 in Group P.p-value is 0.427.It is not statistically significant.

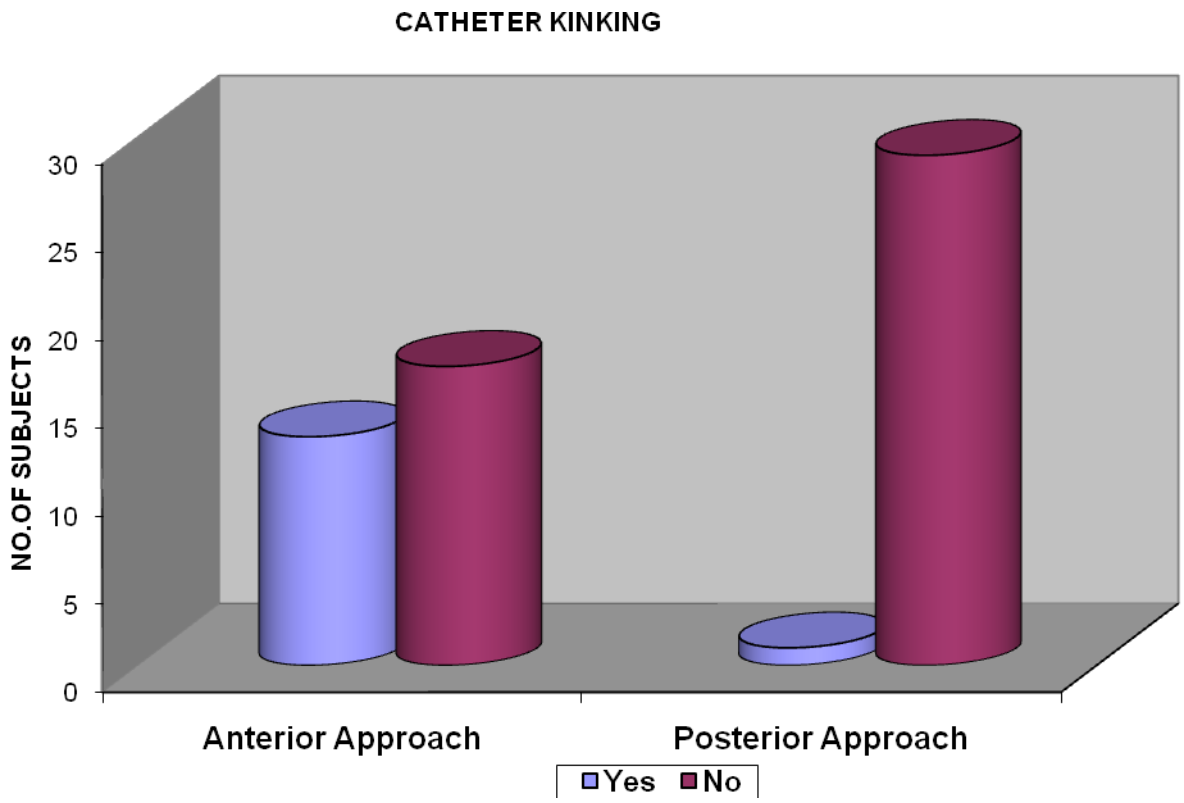
TABLE 21:HEMOTHORAX

Hemothorax	Anterior Approach		Posterior Approach	
	N	%	N	%
Yes	-	-	-	-
No	30	100	30	100
Total	30	100	30	100

Although there were totally 4 cases of pneumothorax, Hemothorax was not observed in any patient in both the groups.

TABLE 22:CATHETER KINKING

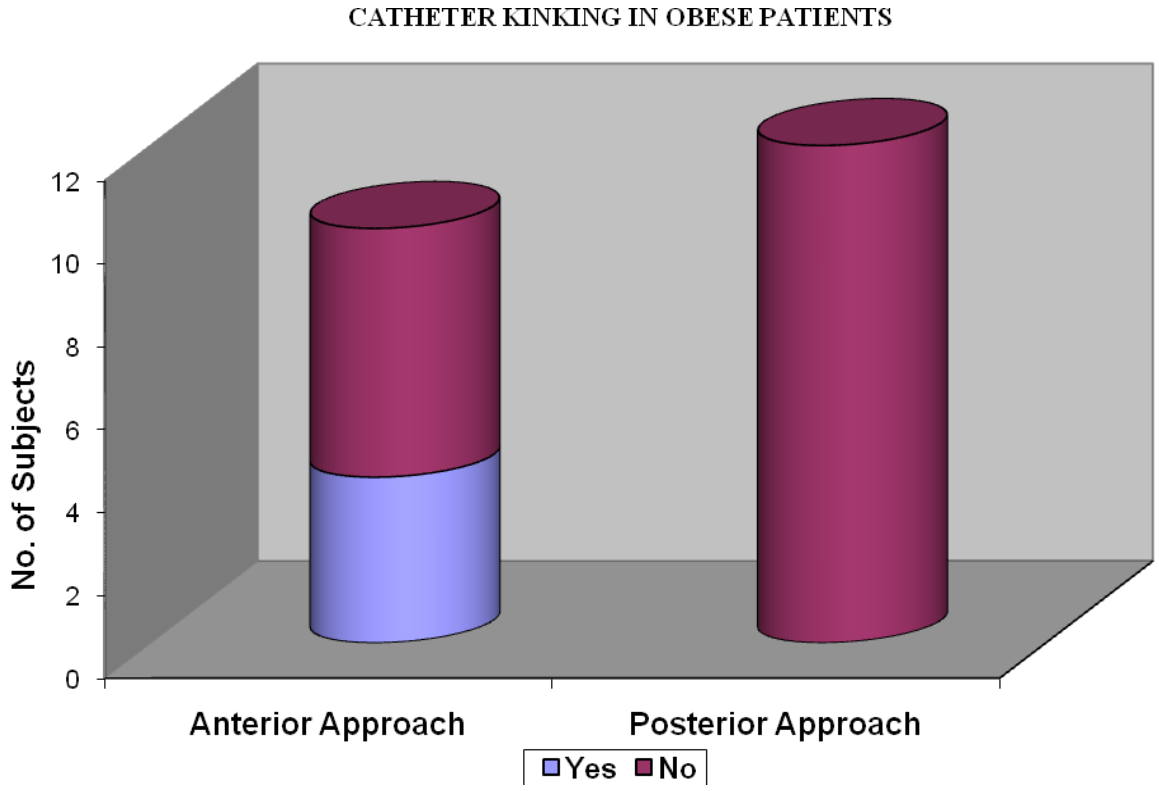
Catheterkinking	Anterior Approach		Posterior Approach		Chi-square Test	
	N	%	N	%	Value	Significant level
Yes	13	43.30	1	3.30	13.41	p-value 0.000
No	17	56.70	29	96.70		
Total	30	100	30	100		



There was kinking of the catheter in 13 patients in Group A and in just 1 patient in Group P.p-value is 0.000.It is both statistically significant.Hence,the rate of catheter kinking is high in the anterior approach than the posterior approach.

TABLE 23:CATHETER KINKING IN OBESE PATIENTS

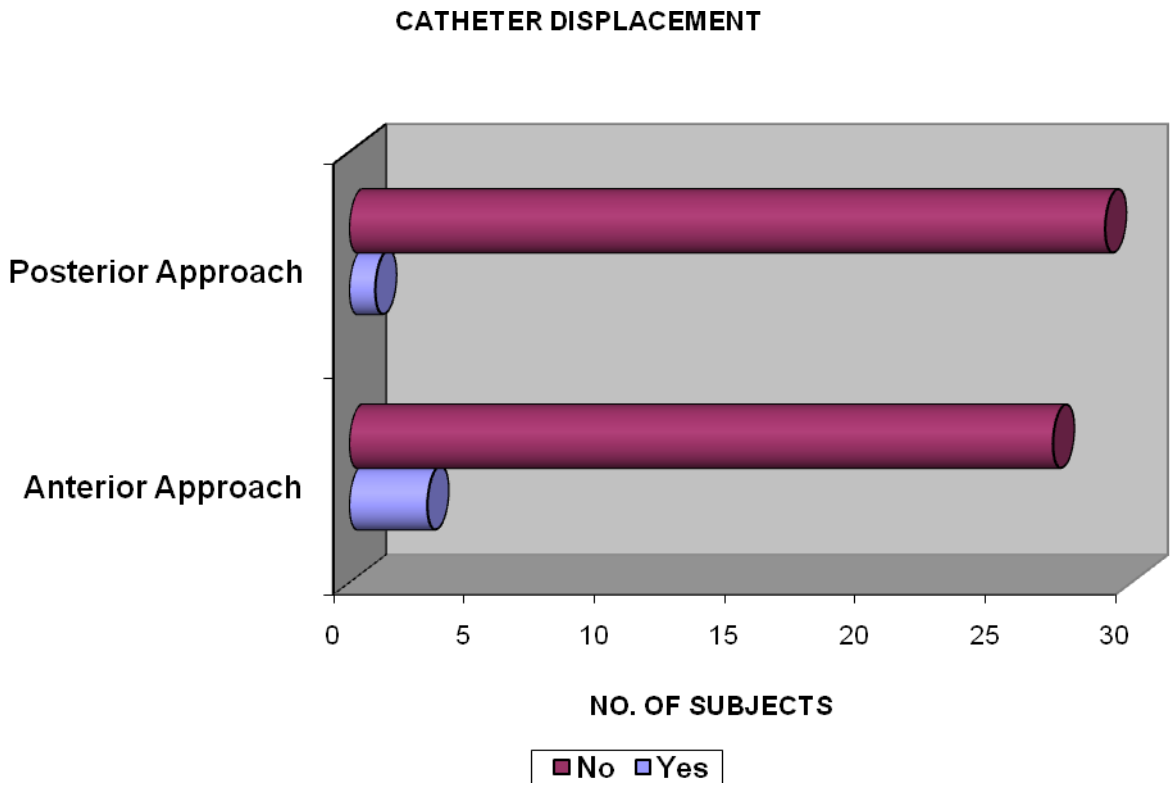
Catheterkinking	Anterior Approach		Posterior Approach		Chi-square Test	
	N	%	N	%	Value	Significant level
Yes	04	40.00	00	00	05.87	0.02 Significant
No	06	60.00	12			
Total	10	100	12	100		



Catheter kinking was seen in 4 patients in Group A.It was not observed in any patients in group P.p-value is 0.02.The results were statistically significant as in the general population.Among the obese patients also catheter kinking is more in the anterior approach.

TABLE 24:CATHETER DISPLACEMENT

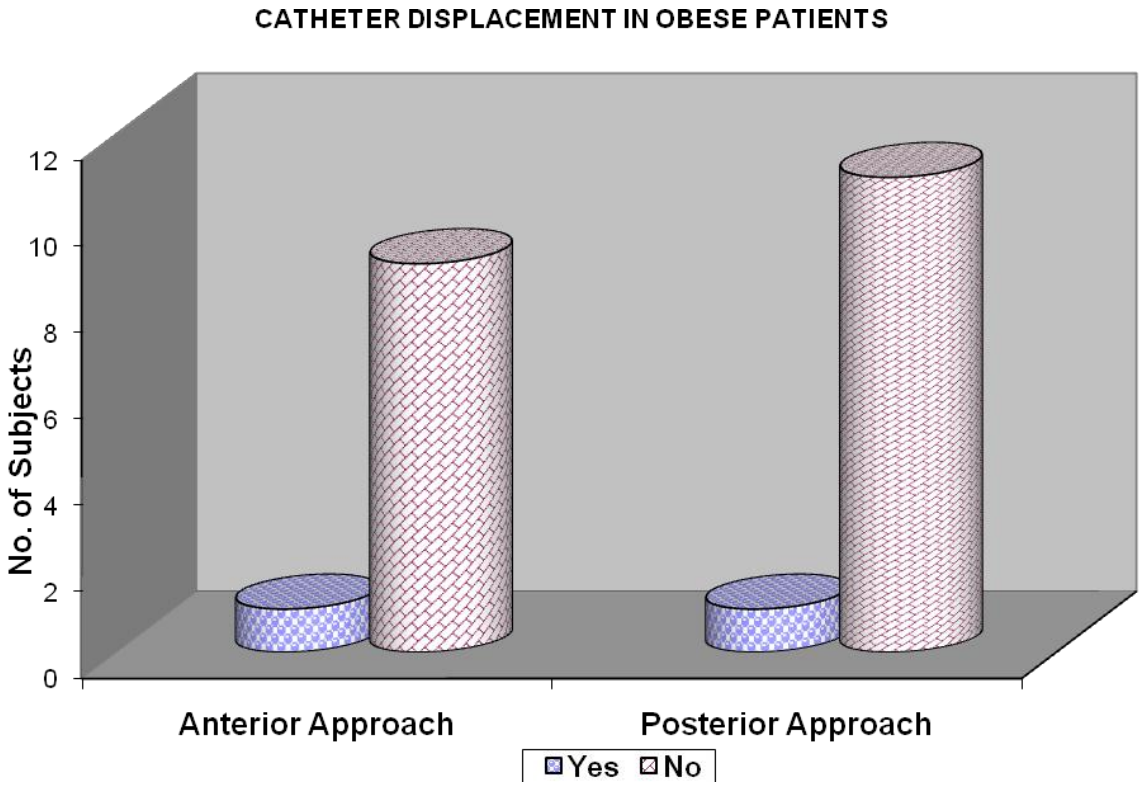
Catheter Displacement	Anterior Approach		Posterior Approach		Chi-square Test	
	N	%	N	%	Value	Significant level
Yes	3	10.00	1	3.30	1.07	p-value 0.30
No	27	90.00	29	96.70		
Total	30	100	30	100		



Catheter was found to be displaced in 3 patients in Group A and in 1 patient in Group P.p-value is 0.30.This is not statistically significant.

TABLE 25:CATHETER DISPLACEMENT IN OBESE PATIENTS

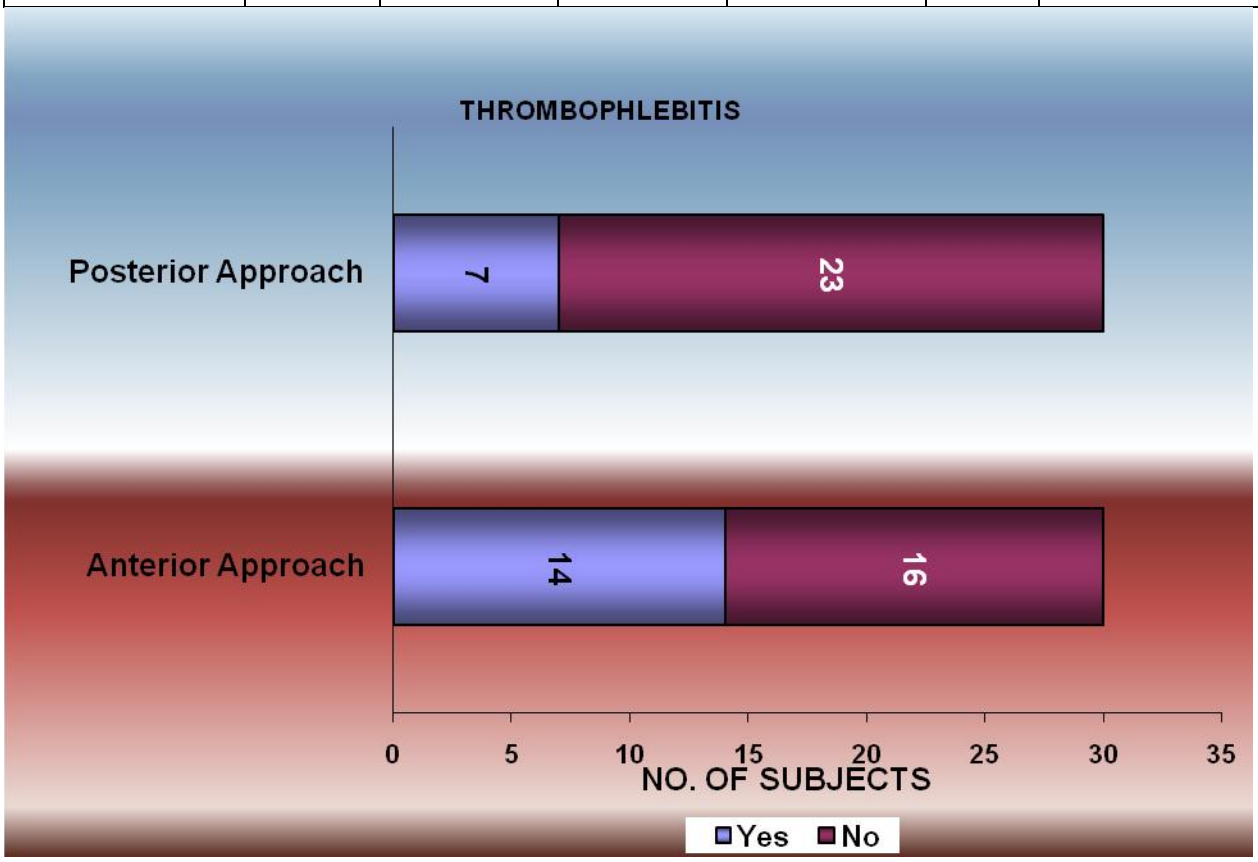
Catheter Displacement	Anterior Approach		Posterior Approach		Chi-square Test	
	N	%	N	%	Value	Significant level
Yes	01	10.00	1	08.30	0.02	p-value 0.89
No	09	90.00	11	91.70		
Total	10	100	12	100		



Catheter displacement was observed in one patient in each group.p-value is 0.89.It is statistically not significant.There is no difference in the rate of catheter displacement with both the approaches in the obese and non-obese.

TABLE 26:THROMBOPHLEBITIS

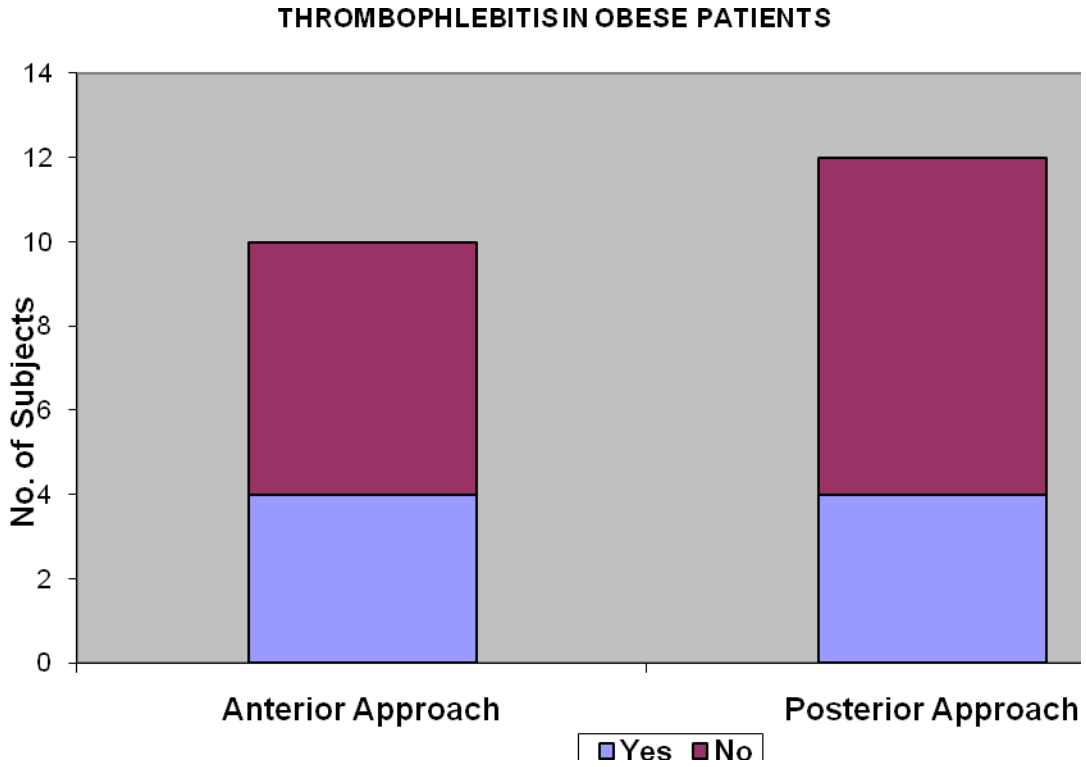
Thrombophlebitis	Anterior Approach		Posterior Approach		Chi-square Test	
	N	%	N	%	Value	Significant level
Yes	14	46.70	07	23.30	3.59	p-value 0.06
No	16	53.30	23	76.70		
Total	30	100	30	100		



There was thrombophlebitis in 14 patients in Group A and in 7 patients in Group P.p-value is 0.06.The results are not statistically significant.

TABLE 27:THROMBOPHLEBITIS IN OBESE PATIENTS

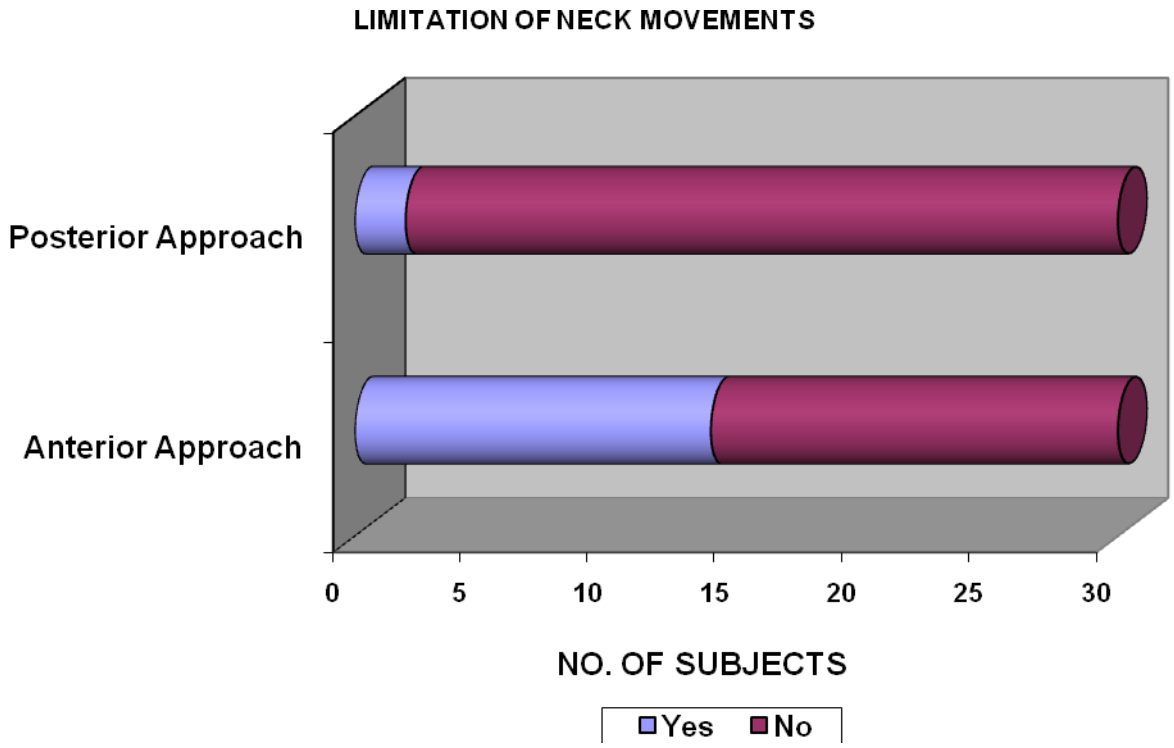
Thrombophlebitis	Anterior Approach		Posterior Approach		Chi-square Test	
	N	%	N	%	Value	Significant level
Yes	04	40.00	04	33.30	0.11	p-value 0.75
No	06	60.00	08	66.70		
Total	10	100	12	100		



Among 10 patients in Group A thrombophlebitis was observed in 4.In Group P,among 12 patients it was seen in 4.p-value is 0.75.The results are statistically not significant.

TABLE 28:LIMITATION OF NECK MOVEMENTS

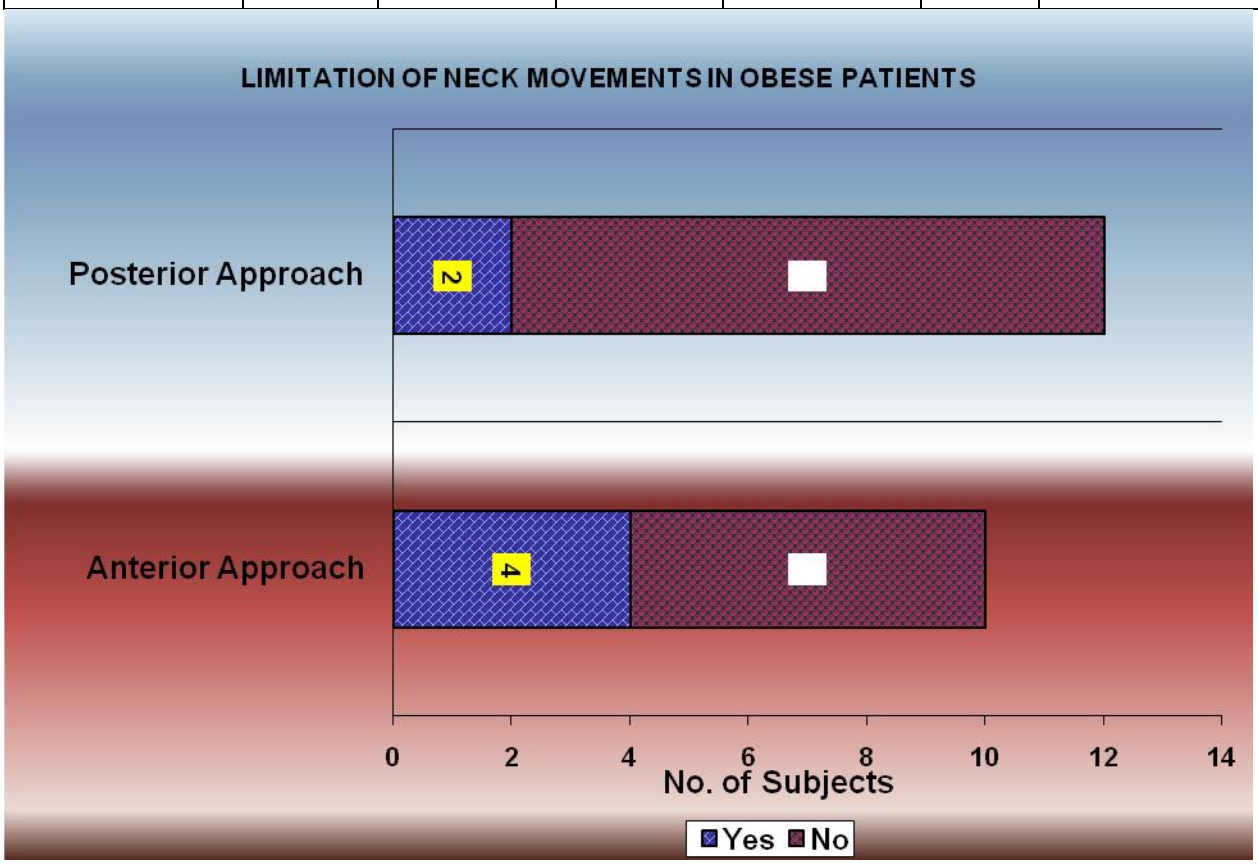
Limitation of Neck Movements	Anterior Approach		Posterior Approach		Chi-square Test	
	N	%	N	%	Value	Significant level
Yes	14	46.70	2	06.70	12.27	p-value 0.000
No	16	53.30	28	93.30		
Total	30	100	30	100		



Fourteen patients in Group A had limitation in neck movements.In group P it was observed only in two patients.p-value is 0.000.Statistically the results are significant.Thus,limitation of neck movements is more with the anterior approach.

TABLE 29:LIMITATION OF NECK MOVEMENTS IN OBESE PATIENTS

Limitation of Neck Movements	Anterior Approach		Posterior Approach		Chi-square Test	
	N	%	N	%	Value	Significant level
Yes	04	40.00	02	16.70	1.50	p-value 0.221
No	06	60.00	10	83.30		
Total	10	100	30	100		



In the obese population limitation of neck movements was seen in 4 patients in Group A and in 2 patients in Group P.p-value is 0.221.The results are not statistically significant in the obese,although significant results were obtained in the general population.

DISCUSSION

Internal jugular vein cannulation can be performed by one of the various approaches,but the success depends on anatomical variations and operator experience.Inspite of the numerous approaches,the anterior approach was selected for the study as it is being conventionally practiced in our institution.Since,Chudhari LS,Karmakar US,Dixit RT,Sonia K et al in Comparison of Anterior and Posterior approaches for Internal jugular vein cannulation(Journal of postgraduate medicine 1998 | Volume : 44 | Issue : 3 | Page : 57-62) has concluded that the posterior approach is easier and safe to cannulate in critically ill and hemodynamically compromised patients,this approach was chosen to compare with the anterior approach.

A sample size of 60 was arrived at based on the results of the Pilot study.A pilot study with a sample size of 5 cases in each group was done before the start of the study to decide on sample size.The mean time for identifying the vein and the standard deviation calculated from the study was used to calculate the sample size.It was calculated based on the formula given in monographers on statistics and applied probability[51,52]

Formula:

$$n = \frac{(Z_{1-\alpha/2} + Z_{1-\beta})^2 2s^2}{d^2}$$

$Z_{1-\alpha/2}$ = 1.96 (5% alpha level of significance) and $Z_{1-\beta}$=0.842 (80% power)

D = difference between two means and S = S_1+S_2 / 2

On entering the values,the mean time for identifying the vein observed in the pilot study for anterior approach was 1.04±1.2 mins.It was 0.47±0.9 mins for the posterior approach.

$N = 2 \times (1.96 + 0.842)^2 (1.2+0.9/2)^2 / (1.04 - 0.47)^2$

$N = 15.7 \times 1.1 / 0.32$

$N = 53.96$

Sample size was taken as 60 to include for the drop outs.Randomisation was done by using sealed envelopes.Patients undergoing Internal jugular vein cannulation by Anterior approach were categorized as Group A and those by Posterior approach as Group P.Data were analyzed using SPSS 11.5 software.Parametric variables were described as Mean+/ -SD.Qualitative analysis was done using chi-square test and

quantitative analysis by student's t-test.P </= 0.05 was considered significant.

The parameters for comparison were selected based on the inferences in various clinical trials and studies.Most of the studies correlate the anatomical variations of internal jugular vein and the relations to carotid artery with the success rate[31-34,40,41].Hence criteria like number of attempts,time taken for identification of the vein,duration of cannulation,carotidpuncture and haematoma were considered for comparison.Apart from carotid puncture,haematoma and pneumothorax,complication like catheter kinking and displacement have also been reported[22,23].So,these were also considered for comparison in the study.

In the study conducted by Chudhari LS,Karmarkar US,Dixit RT,Sonia k[31] et al 58% of patients were cannulated by first attempt by anterior approach and 42% required more than one attempt.By the posterior approach,80% of patients were cannulated by first attempt and 20% required more than one attempt.MohanChandralekha V,Darlong V,Kashyap L[32] et al observed in their study that successful cannulation with few attempts was more in posterior approach (93.8%) than in conventional anterior approach (87.5%).Similar results were obtained in our study.In Group A only 20% of them could be cannulated by first attempt,whereas in Group P it was 66.70%.In Group A 53.30% required a second attempt and in Group P it was only 30%.Clinically there was a vast difference in the

number of patients who were cannulated by third and fourth attempt in both the groups.A third attempt was required for 20% of patients in Group A,but it was 3.30% in Group P.In Group A 6.70% of patients who could be cannulated only by the fourth attempt.In Group P none of the patients required a fourth attempt.The p-value is 0.002.So,both clinically and statistically it is significant.

Among the obese patients also,the reported number of attempts were lesser in the posterior approach[31]. In our study,among the obese patients,only 20% could be cannulated by first attempt,but it was 58.33% in Group P.Among those who required more than one attempt,10% in Group A needed a fourth attempt for cannulation.In Group P none of the patients required a fourth attempt.Although statistically insignificant,clinically the results are significant.The reason for multiple attempts in the anterior approach is due to anatomical variations.Identification of the landmarks is easier in the posterior approach[31].A Haematoma if formed will distort the landmarks.The incidence of haematoma is high in the anterior approach[31,32].These factors may account for the multiple puncture with the anterior approach.

In our study the average time taken to identify the vein was 1 minute and 4 seconds in the anterior approach and 13 seconds in the posterior approach.In the obese group too,the mean time was 1 minute and 4 seconds in the anterior method and 19 seconds in the posterior method.The results were clinically and statistically

significant in both the obese(p-0.005) and non-obese(p-0.0001).Our study results correlate with other studies in literature in which a lesser time was needed to identify the vein in the posterior approach[31-33].

The cannulation time is reported to be shorter in posterior approach than the anterior approach in both the obese and non-obese[31,34].In our study the mean duration of cannulation was 3 minutes and 50 seconds in the anterior approach.By the posterior approach it was 2 minutes and 41 seconds.The results were statistically significant(p-0.000).In the obese patients,the average time was 4 minutes and 4 seconds in anterior method,whereas in posterior method it was 2 minutes and 51 seconds.Among the obese group also the results were statistically significant.The reason for less time consumption in the posterior approach is that the cross-sectional area of the vein is greater in the posterior approach than the anterior approach in the trendelenberg position[34].A larger cross-sectional area in the posterior approach permits earlier identification of the vein and easy threading of the catheter.Hence the time required for cannulation is lesser in the posterior approach.

In our study threading of the catheter was more easier in the posterior approach(83.33%) than the anterior approach(50%).It was statistically significant(p-0.05).In the obese patients also catheter could be threaded easily in the posterior method(66.70%) than the anterior method(30%).But statistically significant results

were not obtained(p-0.09).These results are little contradictory with the previous studies.In many studies,threading of the catheter was easier in the posterior approach in both the obese and non-obese[31-34] .The reason for easier threading of catheter in the posterior approach could be a larger cross-sectional area of the internal jugular vein in this approach[34].

MohanChandralekha V,Darlong V,Kashyap L[32] et al has noted that the incidence of arterial puncture was less in posterior approach (7/80) compared to central approach (18/80) in their study.In the study by Chudhari LS,Karmarkar US,Dixit RT,Sonia K[31] et al also the overall incidence of carotid puncture was high(5%) in anterior approach than the posterior approach(2%).In our study the rate of carotid puncture was overall higher in the anterior approach(50%) as compared to posterior approach(13.33%).On comparing with these studies,although our results were similar,the percentage of carotid puncture was higher in both the groups in our study.Among the obese patients also the reported incidence of carotid puncture is high[31].In our study also,carotid puncture was more in anterior approach(40%) than the posterior approach(16.70%).In all cases of carotid puncture cannula was withdrawn and firm compression was applied.By anterior approach,compression was difficult against the clavicle and the haematoma formed was larger.So,in both obese and non-obese the rate of carotid puncture is high in the anterior

approach.This is because by anterior approach,palpation of landmarks i.e,the heads of sternocleidomastoid is difficult in obese patients.If carotid pulsations are not gently palpated,accidental carotid puncture may occur in the anterior approach and distort the anatomy.In contrast to this,the posterior approach needs identification of only the main bulk of the sternocleidomastoid muscle.The external jugular vein which is the other landmark cold be identified easily by the trendelenburg position[31].Therefore the rate of carotid puncture is drastically reduced in the posterior approach,both in the obese patients and non-obese.

Haematoma can develop rapidly following carotid puncture or slowly following multiple punctures on the vein due to difficult cannulation or threading[40].Most of the studies report a lesser incidence of haematoma with the posterior in both the obese and non-obese[31,32,40,41].In our study,by the anterior method there were 12 cases of haematoma all of which were due to carotid puncture,but only 3 cases of haematoma by posterior method.In the obese patients,by the anterior approach there were 4 cases of haematoma and 2 cases by the posterior approach.Haematoma in both the groups was due to carotid puncture.All haematomas resolved completely within 24 hours without causing any further complications.The lesser rate of haematoma in the posterior method could be due to smaller number of carotid puncture by this route[31,40,41].

Pneumothorax is a dreaded complication of Internal jugular vein cannulation.The incidence of pneumothorax could not be assessed in patients with ICD put in intraoperatively.Although it is a dreaded complication,the incidence reported is nil in many studies[31-34].On the contrary,in our study Pneumothorax occurred in 3 cases in anterior method,out of which 2 were obese.In the posterior method there was one case of pneumothorax and this patient was obese.It is not statistically significant.As cannulation by the posterior approach is anatomically at a higher level than the anterior approach,the incidence of pneumothorax is less in the posterior approach[31].

Another rare complication reported with Internal jugular vein cannulation is hemothorax and hydrothorax.There was no hemothorax in the study conducted by Sharrock NE,Fierro LE[37] et al and also in the study done by Craig RG,Jones RA,Sproul GJ[17] et al.In our study also none of the patients in the obese and non-obese group developed hemothorax.

Kinking of the catheter leads to inadequate Central venous pressure monitoring[4,5].Craig RG,Jones RA,Sproul GJ[17] et al observed 4 cases of catheter kinking in the anterior approach and 5 cases in the posterior approach.On the contrary,in our study there was a higher rate of catheter kinking in the anterior method.In GroupA catheter was kinked in 13 patients,out of which 4 were obese.In

Group P,it was observed only in one patient.There was no catheter kinking among obese patients in the posterior method.The results are both clinically and statistically significant.Mostly catheter kinking occurs due to imperfect suturing of the cannula hub to the skin[31].In some cases,sutures might become loose and cannula may slip out and kink at the junction between the hub and intravenous position[31,32].Proper precautions shpuld be taken to fix the cannula.

Migration of the catheter also leads to false interpretation of central venous pressures[1,2].Infusion of fluids and vasoactive drugs may sometimes lead to hydrothorax and chylothorax[22].Pikwer,A.Baath,L.Davidson.B.Perstoft,I.Ayerson J[23] et al has observed that the rate of catheter malposition was 3.3% in the anterior approach compared with 1% in the posterior approach.Among obese patients it was 5% in the anterior method and 1.6% in the posterior method.In our study catheter was found to be displaced in 10% of cases in the anterior method and 3.3% of cases in the posterior method.In the obese patients,the rate was 10% in anterior approach and 8.30% in posterior appraoch.Statistically significant results was not obtained.Improper suturing leads to catheter slipping during neck movements.So, it can be avoided by proper suturing and fixation.

In the study by Chudhari LS,Karmarkar US,Dixit RT,Sonia K[31] et al,mild thrombophlebitis was noted in 8 cases in the anterior approach and 7 cases in

posterior approach.In our study,thrombophlebitis was observed in 14 cases in Group A,out of which 4 were obese.In Group P it was seen in 7 cases,out of which 4 were obese.The results were not statistically significant.Mild thrombophlebitis is usually associated with cases where cannulation was for 48 hours or more[31].

Craig RG,Jones RA,Sproul GJ[17] et al have observed a comparatively higher rate of limitation in neck movements in the anterior approach in their study.In the anterior method it was 21% and in the posterior method it was 13.3%.Similar results were obtained by Sharrock NE,Fierro LE[37] et al for obese patients in their study.In our study,movements of the neck were found to be limited in 46.7% of cases in Group A and only in 6.7% of cases in Group P.The results are both clinically and statistically significant.In the obese group,it was noted in 40% of cases in the anterior method and in 16.7% of cases in the posterior method.The results were not statistically significant in obese patients in our study.Although the overall incidence was high in anterior approach,there was not much difference among the obese patients in both the approaches.

SUMMARY

The aim of the study is comparison of anterior and posterior approaches for internal jugular vein cannulation in patients undergoing elective and emergency surgeries and in the critically ill. A total of 60 patients were selected and randomly divided into two groups of 30 each.Patients undergoing Internal jugular vein cannulation by anterior approach were categorized as Group A and those by posterior approach as Group P.

The analysed criteria were number of attempts, time taken to identify the vein, duration of cannulation, ease of threading, carotid puncture, haematoma, pneumothorax, hemothorax, catheter kinking, catheter displacement, thrombophlebitis and limitation of neck movements. A comparison of all the parameters was also done separately for the obese patients in both the groups.

All patients were comparable in terms of age,sex and body mass index.The observations of the study were,

- The number of attempts to identify the vein was lesser with the posterior approach than the anterior approach.
- The access time and duration of cannulation was lesser with the posterior approach.

- The posterior approach permits easier threading of catheter than the anterior approach.
- Cannulation by posterior approach reduced the rate of carotid puncture and haematoma.
- The rate of pneumothorax was less in the posterior approach.
- In our study there was a nil incidence of hemothorax in both the groups.
- In the posterior approach there was a low rate of catheter kinking and catheter displacement.
- Other complications like thrombophlebitis and limitation of neck movements were also less with the posterior approach.
- The posterior approach improves the success rate,permits easier access and threading in obese patients.
- The rate of complications like carotid puncture,haematoma and catheter kinking were less with the posterior approach in obese patients.
- The posterior approach provides a safe alternate route in patients like short necked, critically ill, tracheostomy and pathology in lower part of the neck.

CONCLUSION

In conclusion, the posterior approach is better than the anterior approach for Internal jugular vein cannulation as it improves the success rate, permits easy threading of catheter, reduces the access time and duration of cannulation.It reduces the complications like carotid puncture, haematoma, pneumothorax, catheter kinking, catheter displacement,thrombophlebitis and limitation of neck movements.It permits easier access,improves the success rate and reduces the complications in obese patients.

A STUDY ON COMPARISON OF ANTERIOR AND POSTERIOR APPROACHES FOR INTERNAL JUGULAR VEIN CANNULATION

PROFORMA

Name : Serial No.:

Age : Date :

Sex : Height :

I.P.No: Weight :

Diagnosis: Group A/P :

Surgery : Start of surgery :

ASA : End of surgery :

Monitors: Comorbid conditions :

Ecg Informed consent :yes/no

Baseline HR-

BP-

Spo2-

Premedication:

Inj.glycopyrrolate –

Inj.Midazolam (70 microgram/kg) -

Inj.Fentanyl(2 microgram/kg) -

Induction:

Inj.Thipentone(5mg/kg) -

Inj.Vecuronium(0.1mg/kg) -

Intubation:

Internal jugular vein cannulation

Approach:Anterior/Posterior & Right/Left IJV

No. of attempts:First attempt/Second attempt/Multiple attempts

Time taken for identification of vein : Time

From skin puncture by the needle -

To identification of the vein -

Time duration of cannulation : Time

From skin puncture by needle -

To complete threading of catheter -

Ease of threading: Yes/No

Complications of cannulation:

Carotid puncture : Yes/No

Haematoma : Yes/No

Intraop:

HR-

BP-

Spo2-

Extubated/Postop ventilation

ICD- Yes/No

Chest X-Ray:

Catheter position –

Pneumothorax -

Hemothorax -

Postop observation - complications

Catheter kinking - Yes/No

Catheter displacement -Yes/No

Thrombophlebitis - Yes/No

Limitation of neck movements -Yes/No

Remarks: Anesthesiologist's signature:

MASTER CHART

SL.NO.	NAME	DATE	GROUP	AGE (YRS)	GENDER	IP.NO.	BMI (KG/M2)	DIAGNOSIS	PROCEDURE
1	EJAZ AHMED	20.7.10	A	45	M	21891	31.21	INFRA RENAL AORTIC ANEURYSEM&RIGHT FEM POP OCC DISEASE	GRAFT REPAIR & RIGHT FEM POP BYPASS
2	JAYALAKSHMI	2.8.10	A	45	F	25767	30.6	CHOLELITHIASIS & GB PERFORATION	LAPAROTOMY & PROCEED
3	SUBATHRA	3.8.10	P	57	F	25274	30.74	INSULINOMA	ENNUCLEATION
4	VELLATCHI	4.8.10	A	48	F	24520	28.5	HEPATOCELLULAR CA RIGHT LOBE	RIGHT HAPATECTOMY
5	JEYARAJ	4.8.10	A	79	M	27206	20.57	INTESTINAL OBSTRUCTION	LAPAROTOMY & PROCEED
6	ARUNACHALAM	11.8.10	P	72	M	26575	26.9	CA OESOPHAGUS	TRANSHIATAL OESOPHAGECTOMY
7	USMANBASHA	11.8.10	A	73	M	26804	30.8	CA SIGMOID COLON	RIGHT HEMICOLECTOMY
8	SUBRAMANIYAM	12.8.10	A	63	M	27657	20.3	CYSTICNEOPLASM PANCREAS	CENTRAL PANCREATECTOMY
9	NARASIMAN	13.8.10	P	20	M	27197	32.76	CHOLEDOCHAL CYST	EXCISION & HEPATICOJEJUNOSTOMY
10	KANNAN	16.8.10	A	47	M	25989	32.46	POSTGASTRECTOMY EFFERENT LOOP OBSTRUCTION	LAPAROTOMY & PROCEED
11	ADHIKESAVAN	16.8.10	A	70	M	24786	32.04	CHOLELITHIASIS&HEPATOLITHIASIS	CBD EXPLORATION
12	SAMPATH	17.8.10	A	50	M	25716	26.5	CHRONIC CALCIFIC PANCREATITIS	FREY'S PROCEDURE

SL.NO.	NO.OF ATTEMPTS	TIME FOR IDENTIFYING VEIN(SECS)	DURATION OF CANNULATION(MINS)	EASE OF THREADING	CAROTID PUNCTURE	HAEMATOMA	PNEUMOTHORAX	HEMO THORAX	CVP (MMHG)
1	3	110	5	NO	YES	YES	NO	NO	6 TO 8
2	1	20	3	YES	NO	NO	NO	NO	7 TO 10
3	1	30	3	YES	NO	NO	NO	NO	8 TO 10
4	1	30	3	YES	NO	NO	NO	NO	3 TO 4
5	3	100	5	NO	YES	NO	NO	NO	7 TO 9
6	1	28	2.5	YES	NO	NO	NO	NO	9 TO 11
7	2	70	4.5	YES	NO	YES	NO	NO	7 TO 11
8	1	20	3.5	YES	NO	NO	NO	NO	8 TO 12
9	1	25	3	YES	NO	NO	NO	NO	9 TO 11
10	2	60	5	NO	YES	NO	NO	NO	5 TO 7
11	2	60	4	NO	YES	NO	NO	NO	6 TO 9
12	2	70	3.5	YES	YES	YES	NO	NO	9 TO 12

SL.NO.	HR (BEATS/MIN)	SBP (MMHG)	DBP (MMHG)	MAP (MMHG)	SPO2(%)	CATHETER KINKING	CATHETER DISPLACEMENT	THROMBO PHLEBITIS	LIMITATION OF NECK MOVEMENTS
1	82-98	123-150	98-110	73-80	99-100	NO	YES	YES	YES
2	70-89	110-135	64-76	70-76	99-100	YES	NO	YES	YES
3	68-80	108-124	62-78	69-85	99-100	NO	NO	YES	NO
4	66-85	105-132	64-86	72-90	99-100	YES	NO	NO	NO
5	72-88	112-137	65-88	70-96	99-100	NO	NO	NO	NO
6	62-73	115-138	64-79	74-100	99-100	NO	NO	NO	NO
7	72-80	113-124	65-78	75-96	99-100	NO	NO	NO	NO
8	64-72	118-134	68-77	76-100	99-100	YES	NO	NO	NO
9	70-85	112-130	75-88	80-100	99-100	NO	NO	NO	NO
10	75-88	116-129	66-79	70-104	99-100	NO	NO	YES	YES
11	62-70	110-125	69-78	76-88	99-100	YES	NO	NO	NO
12	70-82	118-135	79-90	85-98	99-100	NO	NO	YES	YES

SL.NO.	NAME	DATE	GROUP	AGE(YRS)	GENDER	IP.NO.	BMI(KG/M2)	DIAGNOSIS	PROCEDURE
13	THOMAS	19.8.10	P	58	M	23791	34.17	CORROSIVE STRICTURE OESOPHAGUS	PHARYNGOCOLOPLASTY
14	MUTHULAKSHMI	20.8.10	A	45	F	26197	33.16	PERIAMPULLARY CA	WHIPPLE'S PROCEDURE
15	KALA	20.8.10	P	38	F	28630	31.05	CA SIGMOID COLON	RESECTION &ANASTOMOSIS
16	NAGARAJ	21.8.10	A	50	M	24959	23.82	DISTAL CBD GROWTH &BILIARY OBSTRUCTION	LAPAROTOMY & BILIARY DECOMPRESSION
17	PREETHI	23.8.10	P	17	F	26243	34.6	REMNANT CHOLEDOCHAL CYST	REVISION EXCISION & HEPATICOJEJUNOSTOMY
18	VIJAYAKUMAR	24.8.10	A	55	M	27797	24.9	PSEUDOCYST PANCREAS	CYSTOGASTRECTOMY
19	VAIDEGI	25.8.10	P	31	F	21755	34.6	CORROSIVE STRICTURE OESOPHAGUS	COLOPLASTY
20	SAROJA	27.8.10	A	45	F	29418	31.3	PERIAMPULLARY CA	WHIPPLE'S PROCEDURE
21	RAJAVEL	27.8.10	P	43	M	28128	25.86	PSEUDOMYOMA PERITONOTIS	LAPAROTOMY & PROCEED
22	GANAPATHY	31.8.10	A	31	M	29333	30.44	ADENOMATOSIS POLYPOSIS	TOTAL PROCTOCOLECTOMY
23	CHINA PONNU	31.8.10	P	50	F	29582	33.67	BILIARY STRICTURE	HEPATICOJEJUNOSTOMY
24	RAMASENTHIL	13.9.10	P	33	M	32636	23.5	DENGUE SHOCK SYNDROME	

SL.NO.	NO.OF ATTEMPTS	TIME FOR IDENTIFYING VEIN(SECS)	DURATION OF CANNULATION (MINS)	EASE OF THREADING	CAROTID PUNCTURE	HAEMATOMA	PNEUMOTHORAX	HEMOTHORAX	CVP(MMHG)
13	1	30	3.5	NO	NO	NO	NO	NO	8 TO 10
14	3	100	5.5	NO	YES	YES	NO	NO	7 TO 10
15	1	24	3	YES	NO	NO	NO	NO	9 TO 12
16	2	50	4	YES	NO	YES	NO	NO	10 TO 12
17	2	38	3	NO	YES	YES	NO	NO	6 TO 9
18	2	60	4.5	YES	YES	YES	NO	NO	7 TO 9
19	1	28	2	YES	NO	NO	NO	NO	8 TO 10
20	2	60	4	NO	NO	YES	NO	NO	8 TO 10
21	2	35	3	NO	YES	YES	NO	NO	7 TO 11
22	3	80	3	NO	NO	NO	YES	NO	6 TO 9
23	2	24	2.5	NO	NO	NO	NO	NO	5 TO 7
24	1	26	2	YES	NO	NO	NO	NO	5

SL.NO.	HR(BEATS/MIN)	SBP(MMHG)	DBP(MMHG)	MAP(MMHG)	SPO2(%)	CATHETER KINKING	CATHETER DISPLACEMENT	THROMBOPHLEBITIS	LIMITATION OF NECK MOVEMENTS
13	70-88	112-128	65-78	76-88	99-100	NO	YES	YES	YES
14	72-85	113-126	68-79	73-89	99-100	NO	NO	YES	YES
15	75-86	112-136	72-96	78-104	99-100	NO	NO	NO	NO
16	77-90	114-128	78-86	84-95	99-100	YES	NO	NO	NO
17	77-89	113-136	77-95	80-110	99-100	NO	NO	NO	NO
18	75-86	115-129	75-89	83-104	99-100	NO	NO	YES	YES
19	76-95	108-133	77-96	85-112	99-100	NO	NO	YES	NO
20	72-80	113-128	72-80	80-95	99-100	YES	NO	NO	NO
21	70-99	103-128	76-90	82-114	99-100	NO	NO	NO	NO
22	75-90	117-138	82-96	90-112	99-100	NO	NO	NO	NO
23	64-78	114-129	79-86	88-100	99-100	NO	NO	NO	NO
24	65-77	113-126	76-80	85-93	99-100	NO	NO	NO	NO

SL.NO.	NAME	DATE	GROUP	AGE(YRS)	GENDER	IP.NO.	BMI(KG/M2)	DIAGNOSIS	PROCEDURE
25	RANI	17.9.10	P	29	F	31680	22.44	TOXIC EPIDERMAL NECROLYSIS	
26	SHANMUGAM	3.11.10	A	40	M	39290	20.28	RIGHT FRONTAL SOL	CRANIOTOMY & EXCISION OF SOL
27	TAJUNISHA	11.11.10	P	26	F	84554	27.77	RHD-MITRAL STENOSIS	MITRAL VALVE REPLACEMENT
28	SANKARI	12.11.10	A	42	F	34176	26.15	RHD-MITRAL STENOSIS	MITRAL VALVE REPLACEMENT
29	JEYANTHI	15.11.10	A	32	F	35938	23.45	ATRIAL SEPTAL DEFECT	ASD CLOSURE
30	VALLI	18.11.10	A	42	F	34723	22.22	RHD-MITRAL STENOSIS	MITRAL VALVE REPLACEMENT
31	MOIDEEN	19.11.10	P	35	M	34593	35.15	RHD-MITRAL REGURGITATION	MITRAL VALVE REPLACEMENT
32	AYYAPPAN	22.11.10	A	17	M	29155	21.96	TETROLOGY OF FALLOT	COMPLETE CORRECTION
33	SATHYAVANI	24.11.10	P	42	F	30273	30.6	RHD-MITRAL REGURGITATION	MITRAL VALVE REPLACEMENT
34	NIRMALA	25.11.10	A	30	F	34211	24.48	RHD-MITRAL REGURGITATION	MITRAL VALVE REPLACEMENT
35	ADAMBASHA	26.11.10	A	18	M	33516	31.21	VALVULAR PULMONARY STENOSIS	OPEN PULMONARY VALVOTOMY
36	SANTHAKUMAR	29.11.10	A	18	M	39652	22.03	ATRIAL SEPTAL DEFECT	ASD CLOSURE

SL.NO.	NO.OF ATTEMPTS	TIME FOR IDENTIFYING VEIN(SECS)	DURATION OF CANNULATION(MINS)	EASE OF THREADING	CAROTID PUNCTURE	HAEMATOMA	PNEUMO THORAX	HEMO THORAX	CVP (MMHG)
25	1	20	2.5	YES	NO	NO	NO	NO	7
26	2	80	5	YES	NO	NO	NO	NO	7 TO 9
27	2	40	3	YES	YES	NO	NO	NO	6 TO 8
28	1	50	3	YES	NO	NO	NO	NO	7 TO 9
29	3	120	6	NO	YES	NO	NO	NO	6 TO 10
30	2	75	4.5	YES	YES	YES	NO	NO	7 TO 10
31	2	45	3.5	NO	YES	YES	NO	NO	6 TO 9
32	4	300	4.5	NO	YES	YES	NO	NO	6 TO 8
33	2	40	3	YES	NO	NO	NO	NO	7 TO 9
34	1	30	2.5	YES	NO	NO	NO	NO	7 TO 10
35	1	35	3	YES	NO	NO	NO	NO	10 TO 12
36	2	90	4.5	NO	NO	NO	NO	NO	8 TO 12

SL.NO.	HR (BEATS/MIN)	SBP (MMHG)	DBP (MMHG)	MAP (MMHG)	SPO2 (%)	CATHETER KINKING	CATHETER DISPLACEMENT	THROMBO PHLEBITIS	LIMITATION OF NECK MOVEMENTS
25	72-78	112-120	70-80	80-96	99-100	NO	NO	YES	NO
26	77-95	124-137	77-89	89-100	99-100	NO	NO	NO	NO
27	76-95	108-120	65-78	72-90	99-100	YES	NO	NO	NO
28	83-99	105-113	64-75	70-85	99-100	NO	YES	YES	YES
29	72-86	109-119	62-70	73-84	99-100	YES	NO	YES	YES
30	70-88	105-117	60-73	72-90	99-100	NO	NO	YES	YES
31	72-90	113-126	75-88	84-100	99-100	NO	NO	NO	NO
32	79-92	112-133	69-78	78-90	99-100	NO	NO	YES	YES
33	88-100	115-136	70-88	80-104	99-100	NO	NO	YES	YES
34	72-95	108-128	71-89	79-98	99-100	NO	NO	NO	NO
35	70-88	110-135	72-85	80-97	99-100	NO	NO	NO	NO
36	70-83	113-126	75-90	87-100	99-100	YES	NO	YES	YES

SL.NO.	NAME	DATE	GROUP	AGE (YRS)	GENDER	IP.NO.	BMI (KG/M2)	DIAGNOSIS	PROCEDURE
37	PRAKASAM	6.12.10	P	46	M	66697	19.53	CHRONIC KIDNEY DISEASE	RENAL TRANSPLANT RECEPIENT(CADAVER)
38	MEEGA	16.12.10	A	27	M	66856	18.36	CHRONIC KIDNEY DISEASE	RENAL TRANSPLANT RECEPIENT(LIVE DONOR)
39	DANALAKSHMI	23.12.10	P	38	F	66958	21.22	CHRONIC KIDNEY DISEASE	RENAL TRANSPLANTATION RECEPIENT(LIVE DONOR)
40	PANCHAVARNAM	6.4.11	P	29	F	3063	30.72	RHD-MITRAL STENOSIS&LA CLOT	MITRAL VALVE REPLACEMENT
41	JOSHY	12.4.11	P	36	F	11615	29.08	CONSTRICTIVE PERICARDITIS	PERICARDIECTOMY
42	MOHAMMED ALI	6.5.11	P	60	M	12757	27.12	RIGHT TENTORIAL MENINGIOMA	EXCISION
43	AROKIYA DOSS	17.5.11	A	30	M	13872	20.76	PERIAMPULLARY CA	WHIPPLE'S PROCEDURE
44	NATESAN	17.5.11	P	40	M	13367	27.34	CHRONIC CALCIFIC PANCREATITIS&BILIARY STRICTURE	FREY'S PROCEDURE
45	REVATHY	17.5.11	P	19	F	12126	23.04	RHD-MITRAL REGURGITATION	MITRAL VALVE REPLACEMENT
46	MAHALAKSHMI	18.5.11	A	40	F	11322	34.6	POST CHOLECYSTECTOMY BILIARY STRICTURE	HEPATICOJEJUNOSTOMY
47	CHINDAMANI	18.5.11	P	16	F	14052	23.66	ATRIAL SEPTAL DEFECT	ASD CLOSURE
48	RANGARAJ	19.5.11	A	56	M	15447	20.24	SUBTOTAL GASTRECTOMY-INTESTINAL OBSTRUCTION	RELAPAROTOMY&PROCEED

SL.NO.	NO.OF ATTEMPTS	TIME FOR IDENTIFYING VEIN(SECS)	DURATION OF CANNULATION(MINS)	EASE OF THREADING	CAROTID PUNCTURE	HAEMATOMA	PNEUMOTHORAX	HEMO THORAX	CVP (MMHG)
37	1	26	2.5	YES	NO	NO	NO	NO	7 TO 10
38	2	90	3	YES	YES	YES	NO	NO	7 TO 9
39	1	25	2	YES	NO	NO	NO	NO	8 TO 10
40	3	100	3	YES	NO	NO	YES	NO	7 TO 9
41	1	30	3	YES	NO	NO	NO	NO	8 TO 10
42	3	100	3	YES	NO	NO	YES	NO	7 TO 9
43	1	30	3	YES	NO	NO	NO	NO	8 TO 10
44	1	20	2.5	YES	NO	NO	NO	NO	6 TO 9
45	3	90	3	NO	NO	NO	YES	NO	7 TO 9
46	2	30	3	YES	NO	NO	NO	NO	7 TO 10
47	1	26	2	YES	NO	NO	NO	NO	6 TO 9
48	4	120	4	NO	NO	NO	YES	NO	7 TO 11

SL.NO.	HR (BEATS/MIN)	SBP (MMHG)	DBP (MMHG)	MAP (MMHG)	SPO2(%)	CATHETER KINKING	CATHETER DISPLACEMENT	THROMBO PHLEBITIS	LIMITATION OF NECK MOVEMENTS
37	75-90	147-160	100-112	110-128	99-100	NO	NO	YES	NO
38	77-95	145-158	102-110	112-130	99-100	NO	YES	NO	NO
39	72-85	116-129	78-95	87-106	99-100	NO	NO	NO	NO
40	80-93	122-136	75-90	86-102	99-100	NO	NO	NO	NO
41	68-74	102-110	58-60	66-75	99-100	NO	NO	NO	NO
42	77-90	113-130	76-90	88-104	99-100	NO	NO	NO	NO
43	71-88	109-128	77-95	87-106	99-100	YES	NO	NO	NO
44	70-86	116-129	70-95	83-107	99-100	NO	NO	YES	NO
45	72-88	113-136	72-86	81-95	99-100	NO	NO	NO	NO
46	72-90	108-135	77-89	88-101	99-100	YES	NO	NO	NO
47	70-89	112-126	76-90	84-105	99-100	NO	NO	NO	NO
48	72-95	112-129	73-90	82-100	99-100	NO	NO	YES	YES

SL. NO.	NAME	DATE	GROUP	AGE (YRS)	GENDER	IP. NO.	BMI (KG/M2)	DIAGNOSIS	PROCEDURE
49	IYARI	19.5.11	P	60	M	13850	25.71	INTESTINAL OBSTRUCTION	LAPAROTOMY & PROCEED
50	MOHAN	19.5.11	A	41	M	12165	24.9	MITRAL REGURGITATION&AORTIC REGURGITATION	DOUBLE VALVA REPLACEMENT
51	MANOHARAN	20.5.11	A	40	M	15745	23.05	UNCINATE PROCESS GROWTH	WHIPPLE'S PROCEDURE
52	PONKODI	20.5.11	P	28	F	16459	28	CYSTICNEOPLASM PANCREAS	DISTAL PANCREATECTOMY
53	IYALAR	23.5.11	P	45	F	14017	38.26	CHOLEDOCHAL CYST	EXCISION&HEPATICOJEJUNOSTOMY
54	THAVAMANI	23.5.11	A	38	F	14615	26.66	RHD-MITRAL REGURGITATION	MITRAL VALVE REPLACEMENT
55	RATHINAM	24.5.11	P	78	M	14998	20.2	PERIAMPULLARY CA	WHIPPLE'S PROCEDURE
56	VEERAMMAL	24.5.11	P	20	F	14063	22.22	CHRONIC CALCIFIC PANCREATITIS	FREY'S PROCEDURE
57	KATHIRESAN	26.5.11	P	43	M	14992	17.3	CA SIGMOID COLON WITH LIVER SECONDARIES	SIGMOIDECTOMY & COLOSTOMY
58	RAJESWARI	27.5.11	A	57	F	15140	22.22	PERIAMPULLARY CA	WHIPPLE'S PROCEDURE
59	SHANTHI	27.5.11	P	18	F	16602	34.01	RHD-MITRAL REGURGITATION	MITRAL VALVE REPLACEMENT
60	SUBRAMANI	28.5.11	P	35	M	18235	28.76	INTESTINAL OBSTRUCTION	LAPAROTOMY&PROCEED

SL.NO.	NO.OF ATTEMPTS	TIME FOR IDENTIFYING VEIN(SECS)	DURATION OF CANNULATION(MINS)	EASE OF THREADING	CAROTID PUNCTURE	HAEMATOMA	PNEUMO THORAX	HEMO THORAX	CVP (MMHG)
49	1	26	2.5	YES	NO	NO	NO	NO	9 TO 10
50	2	35	3.5	YES	NO	NO	NO	NO	8 TO 10
51	2	40	3	NO	YES	NO	NO	NO	7 TO 9
52	2	40	3	YES	NO	NO	NO	NO	6 TO 9
53	1	26	2.5	YES	NO	NO	NO	NO	7 TO 10
54	2	40	3	YES	YES	YES	NO	NO	7 TO 11
55	1	28	3	YES	NO	NO	NO	NO	8 TO 12
56	1	22	2.5	YES	NO	NO	NO	NO	8 TO 12
57	1	20	3	YES	NO	NO	NO	NO	9 TO 12
58	2	40	4	NO	YES	NO	NO	NO	7 TO 9
59	1	20	3	YES	NO	NO	NO	NO	8 TO 10
60	1	15	2.5	YES	NO	NO	NO	NO	7 TO 9

SL.NO.	HR (BEATS/MIN)	SBP (MMHG)	DBP (MMHG)	MAP (MMHG)	SPO2(%)	CATHETER KINKING	CATHETER DISPLACEMENT	THROMBO PHLEBITIS	LIMITATION OF NECK MOVEMENTS
49	66-80	113-129	71-80	80-92	99-100	NO	NO	NO	NO
50	66-79	113-126	72-90	83-104	99-100	YES	NO	NO	NO
51	69-78	114-138	76-89	86-100	99-100	NO	NO	NO	NO
52	74-89	112-130	72-88	83-100	99-100	NO	NO	NO	NO
53	70-86	116-129	65-80	75-94	99-100	NO	NO	NO	NO
54	72-88	113-129	77-93	86-104	99-100	YES	NO	YES	YES
55	70-84	112-125	75-88	86-100	99-100	NO	NO	NO	NO
56	72-90	114-128	80-92	90-103	99-100	NO	NO	NO	NO
57	77-90	120-135	82-90	91-113	99-100	NO	NO	NO	NO
58	70-88	124-136	80-96	94-108	99-100	YES	NO	YES	YES
59	72-88	120-133	72-90	83-100	99-100	NO	NO	NO	NO
60	70-84	115-128	78-86	90-98	99-100	NO	NO	NO	NO

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INSTITUTIONAL ETHICAL COMMITTEE, STANLEY MEDICAL COLLEGE, CHENNAI-3

Title of the Work	: Comparison of Anterior and posterior approaches for internal jugular vein cannulation
Principal Investigator	: Dr.B. Ushakiran
Designation	: 2nd year M.D. Anesthesiology Post Graduate
Department	: Department of Anesthesiology Government Stanley Medical College, Chennai-1

The request for an approval from the Institutional Ethical Committee (IEC) was considered on the IEC meeting held on 19.11.2010 at the Modernized Seminar Hall, Stanley Medical College, Chennai-1 at 2PM

The members of the Committee, the secretary and the Chairman are pleased to approve the proposed work mentioned above, submitted by the principal investigator.

The Principal investigator and their team are directed to adhere to the guidelines given below:

1. You should inform the IEC in case of changes in study procedure, site investigator investigation or guide or any other changes.
2. You should not deviate form the area of the work for which you applied for ethical clearance.
3. You should inform the IEC immediately, in case of any adverse events or serious adverse reaction.
4. You should abide to the rules and regulation of the institution(s).
5. You should complete the work within the specified period and if any extension of time is required, you should apply for permission again and do the work.
6. You should submit the summary of the work to the ethical committee on completion of the work.

MEMBER SECRETARY,
IEC, SMC, CHENNAI

1/2/11.

நோயாளி தகவல் தாள்

இன்டர்னல் ஜூகுலார் வெயின் (INTERNAL JUGULAR VEIN) கேனுலேஷன் (CANNULATION) ஆன்பீரியர் (ANTERIOR) மற்றும் போஸ்டீரியர் (POSTERIOR) அணுகுமுறைகளை ஒப்பிடும் ஆய்வு.

நோயாளிகளுக்கான தகவல் :

ஆராய்ச்சியின் நோக்கமும், ஆதாயங்களும்

உங்கள் உறவினரை ஈடுபடுத்த திட்டமிடப்பட்டுள்ள இந்த மருத்துவ ஆராய்ச்சி ஆய்வானது. அறுவை சிகிச்சையின் போது இன்டர்னல் ஜூகுலார் வெயின் கேனுலேஷன் செய்யும் இருவேறு முறைகளை ஒப்பிடும் ஆய்வாகும்.

பொதுவாக இத்தகைய அறுவை சிகிச்சைகள், நோயாளியின் சுவாசக் குழாயில் (TRACHEA) சிறு டியூப் (ENDOTRACHEAL TUBE) மூலம் மயக்க மருந்து கொடுக்கப்படும்.

இன்டர்னல் ஜூகுலார் வெயின் என்னும் இரத்தக் குழாயானது மூளைக்குச் செல்லும் இரத்தக் குழாயின் (CAROTLD ARTERY) அருகே உள்ளது. இதனை ஆன்டீரியர் (ANTERIOR) அணுகுமுறையால் அணுகுவது சற்று கடினம்.மற்றும் நேரமும் அதிகமாகும். அதுவே போஸ்டீரியர் (POSTERIOR) அணுகுமுறையால் அணுகுதல் சுலபம் மற்றும் நேரமும் குறைவானதாகும். ஏற்படும் விளைவுகளும் குறைவானதாகும்.

ஆய்வு முறை :

இந்த ஆய்வில் உங்கள் உறவினருக்கு அறுவை சிகிச்சைக்கு செல்லும் முன் தூக்கமருந்து கொடுத்து அறைக்கு எடுத்துச் செல்லப்படுவார்கள். அங்கு மயக்க மருந்து கொடுக்கப்படும். பின்பு INTERNAL JUGULAR VEIN ANTERIOR அல்லது POSTERIOR அணுகுமுறையின் மூலம் CANNULATION செய்யப்பட்டு அறுவை சிகிச்சை செய்யப்படும். சிகிச்சைக்குப் பின் மயக்கத்திலிருந்து வெளியே கொண்டு வரப்பட்டு ENDOTRACHEAL TUBE எடுக்கப்படும்.

உண்டாக கூடிய இடர்கள் :

அனைத்து மயக்க மருந்து மற்றும் மயக்க முறைகளுடன் இருப்பது போலவே இந்த முறையிலும் சில எதிர்பாரா இடர்கள் நடைபெறலாம். INTERNAL JUGULAR VEIN CANNULATION செய்யும் போது மூளைக்கு செல்லும் இரத்தக்குழாய் மற்றும் நுரையீரல் இவை காயமடைய வாய்ப்புள்ளது.

ஆய்வில் உங்கள் உரிமைகள் :

உங்கள் மருத்துவப் பதிவேடுகள் மிகவும் அந்தரங்கமாக வைத்துக் கொள்ளப்படும். இந்த ஆய்வின் முடிவுகள் அறிவியல் பத்திரிக்கைகளில் பிரசுரிக்கப்படலாம். ஆனால், பெயரை வெளியிடுவது மூலம் உங்கள் உறவினர் அடையாளம் காட்டப்படமாட்டார்கள். இந்த ஆய்வில் உங்கள் உறவினரின் பங்கேற்பு தன்னிச்சையானது மற்றும் காரணங்கள் எதையும் கூறாமலேயே நீங்கள் இந்த ஆய்விலிருந்து எந்த ஒரு நேரத்திலும் விலகிக் கொள்ளலாம். எப்படி இருந்தாலும் உங்கள் உறவினருக்கு தகுந்த மயக்க மருந்து கொடுத்து அறுவை சிகிச்சை செய்யப்படும். இந்த ஆய்வில் ஏதேனும் பக்க விளைவுகள் ஏற்பட்டால் உங்கள் உறவினருக்கு முழு சிகிச்சை மருத்துவ குழுவினரால் அளிக்கப்படும்.

நாள்

நோயாளியின் கையொப்பம்
இடது பெருவிரல் ரேகை
(மருத்துவரால் படித்து காட்டப்பட்டது

<u>சுய ஒப்புதல் படிவம்</u>

<u>ஆய்வு செய்யப்படும் தலைப்பு</u>

இன்டர் ஜுகுலார் வெயின் கேனுலேஷன் -
ஆன்டீரியர் மற்றும் போஸ்டீரியர் அணுகுமுறைகளை
ஒப்பிடும் ஆய்வு.

ஆராய்ச்சி நிலையம் : அரசு ஸ்டான்லி மருத்துவமனை
சென்னை - 600 001,

பங்கு பெறும் நோயாளியின் பெயர் : வயது :

பங்கு பெறும் நோயாளியின் எண் : பாலினம் : ஆண் / பெண்

உறவினரின் பெயர்/விலாசம் :

உறவினர் இதனை (√) குறிக்கவும்

மேலே குறிப்பிட்டுள்ள மருத்துவ ஆய்வின் விவரங்கள் எனக்கு விளக்கப்பட்டது. என்னுடைய சந்தேகங்களை கேட்கவும். அதற்கான தகுந்த விளக்கங்களை பெறவும் வாய்ப்பளிக்கப்பட்டது. ☐

நான் என் உறவினரை இவ்வாய்வில் தன்னிச்சையாகதான் பங்கேற்க வைக்கிறேன். எந்த காரணத்தினாலோ எந்த கட்டத்திலும் எந்த சட்ட சிக்கலுக்கும் உட்படாமல் என் உறவினரை இவ்வாய்வில் இருந்து விலக்கி கொள்ளலாம் என்றும் அறிந்து கொண்டேன். ☐

இந்த ஆய்வு சம்பந்தமாகவோ, இதை சார்ந்த மேலும் ஆய்வு மேற்கொள்ளும் போதும் இந்த ஆய்வில் பங்குபெறும் மருத்துவர் என் உறவினருடைய மருத்துவ அறிக்கைகளை பார்ப்பதற்கு என் அனுமதி தேவையில்லை என அறிந்து கொள்கிறேன். என் உறவினரை ஆய்வில் இருந்து விலகிக் கொண்டாலும் இது பொருந்தும் என அறிகிறேன். ☐

இந்த ஆய்வின் மூலம் கிடைக்கும் தகவல்களையும், பரிசோதனை முடிவுகளையும் மற்றும் சிகிச்சை தொடர்பான தகவல்களையும் மருத்துவர் மேற்கொள்ளும் ஆய்வில் பயன்படுத்திக் கொள்ளவும் அதை பிரசுரிக்கவும் என் முழு மனதுடன் சம்மதிக்கிறேன். ☐

இந்த ஆய்வில் என் உறவினரை ஈடுபடுத்த முழுமனதுடன் ஒப்புக் கொள்கிறேன். இந்த மயக்க மருந்துகள் மற்றும் மயக்க முறையினால் ஏற்படக் கூடிய பின் விளைவுகள் மற்றும் எதிர்பாராத விளைவுகள் பற்றி எனக்கு விளக்கமாக தெரிவிக்கப்பட்டது. ☐

இந்த ஆய்வில், என் உறவினருக்கு, சுவாசம் மூலம் மயக்க மருந்து கொடுக்கப்பட்டு, INTERNAL JUGULAR VEIN ஆன்டீரியர் அல்லது போஸ்டீரியர் அணுகுமுறை மூலம் கேனுலேஷன் செய்யப்படும் என்பதை அறிந்து அதற்கு முழுமனதுடன் சம்மதிக்கிறேன். ☐

இந்த ஆய்வில், என் உறவினரின் நலன் கருதியே பங்கேற்கிறேன். ☐

உறவினரின் கையொப்பம்.....இடம்.....தேதி

கட்டைவிரல் ரேகை (இந்த படிவம் படித்து காட்டப்பட்டு புரிந்து கைரேகை அளிக்கின்றேன்)

ஆய்வாளரின் கையொப்பம்.....இடம்.....தேதி

ஆய்வாளரின் பெயர்.....